# WIRE AND WIRE PRODUCTS

JANUARY 1957

-and VAUGHN®

Double
-Cooling

yanked the heat
out *FAST*

WITHOUT
SOAKING ACTION

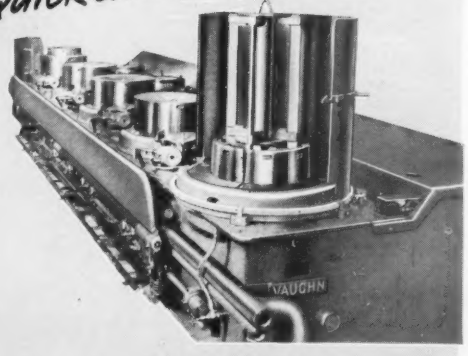
Yes, you can run up really big bundles on Vaughn Motoblox—safely, speedily, with the wire in perfect condition thanks to Vaughn Double-Cooling! Air blast and water jets *combined* do a dual cooling job, yanking heat away before the wire is affected. No storage means no heat-soak, either! *Get the facts from Vaughn.*

Ⓥ®

THE VAUGHN MACHINERY COMPANY
CUYAHOGA FALLS, OHIO, U.S.A.

COMPLETE COLD DRAWING EQUIPMENT .... Continuous or Single Hole ... for the Largest Bars and Tubes ... for the Smallest Wire ... Ferrous, Non-Ferrous Materials or their Alloys.

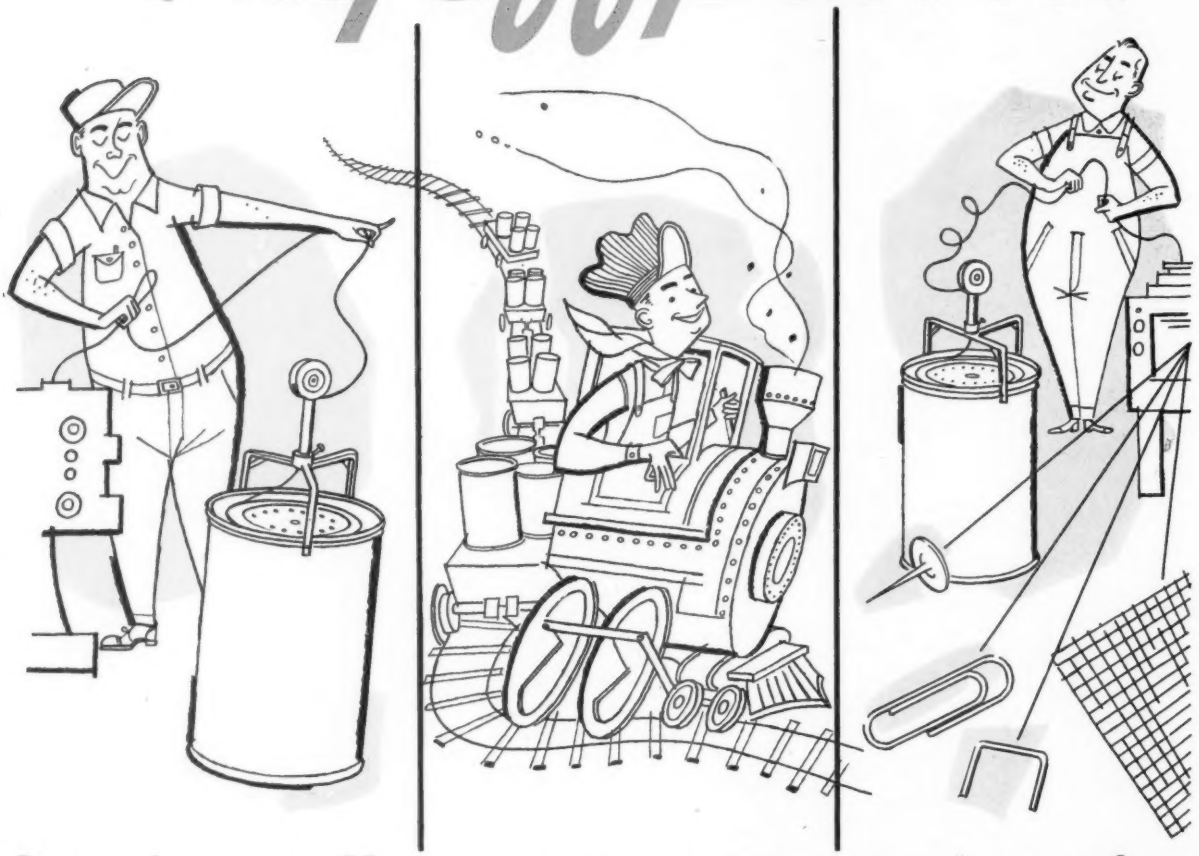
"Quick on the Draw!"




5/6 HRM Motoblox® with Front Safety Guard and Finishing Block Guard in open position.


OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

# Payoffpak®...



## Continental's new way to send a wire

By automatically packaging wire as it is drawn, Continental's Payoffpak has revolutionized the handling of wire! These fibre drums put an end to small manually handled coils that are costly to produce and costly to use. What's more, the wire is untouched by dirty or sweaty hands and remains protected in the sturdy drums until ready to use. Lightweight Payoffpaks can hold 600 lbs. of wire each; high stacking strength means you can save on storage space too.

So check into Payoffpak—it will mean bigger profits for you. Call Continental soon for the interesting facts.

**CONTINENTAL CAN COMPANY**

FIBRE DRUM DIVISION • VAN WERT, OHIO

New York • Philadelphia • Pittsburgh • Tonawanda • Cleveland • Chicago
Atlanta • St. Louis • San Francisco • Los Angeles • Eau Claire • Boston

# What's New in "America's Finest Wire Drawing Lubricants"?

1. - 302 Powder —for Drawing Multiple Drafts of Zig-Zag Spring Wire.

2. - 304 Powder —for Drawing Multiple Drafts of Zig-Zag Spring Wire.

3. - 306 Powder —for Drawing Multiple Drafts of X-Clean Bright Wire.

4. - 405 Powder —for Drawing Multiple Drafts Smut Free, for Annealing.

5. - 1005 Powder —for Drawing Multiple Drafts of Galvanized Wire.

## SERVICE CENTERS

**JOHN A. MORITZ, President, c/o Standard Industrial Compounds Co., Frankfort, Ill.**

**EARL BOWERS, Vice Pres., 66 Dolphin Drive, Treasure Island 6, Fla.**

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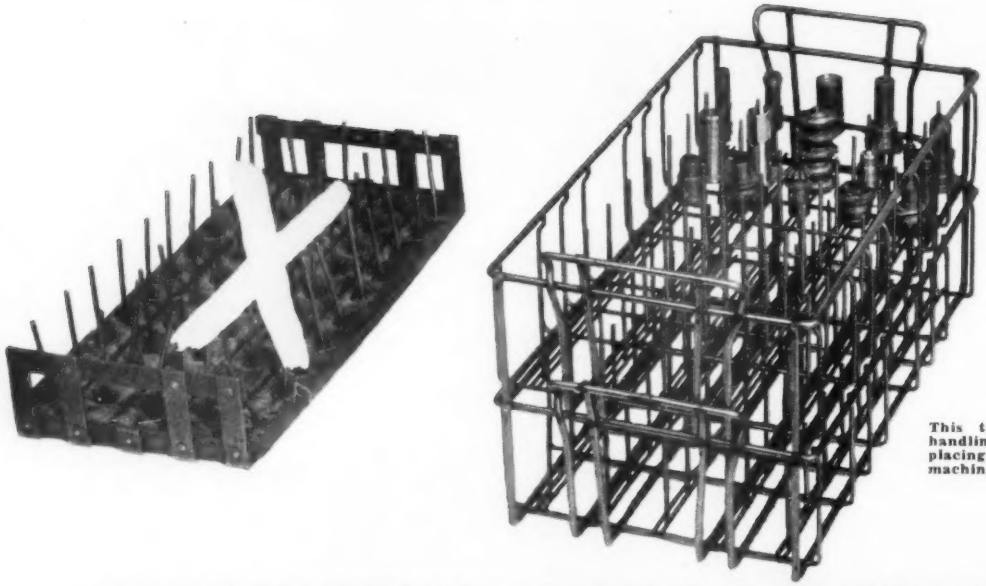
**KENT BOSWORTH, 46 Manhattan Road, Joliet, Ill.**

Standard Industrial has pioneered in most of the outstanding contributions to better wire drawing through better lubricants. Consult Standard Industrial for the solution of your difficult problems.

Standard Industrial
COMPOUNDS CO., INC.

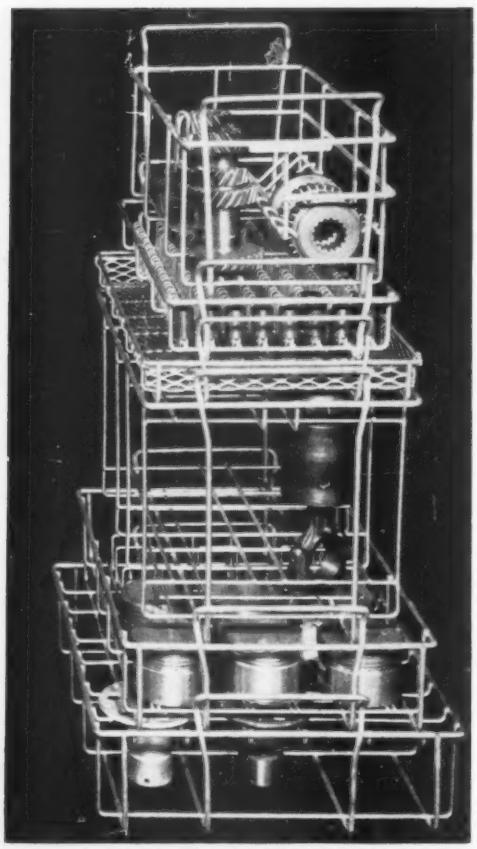
**FRANKFORT, ILLINOIS**
(A suburban Chicago area city)
TELEPHONES: 2131 — 2141



This type all-wire materials handling baskets are fast replacing old style home-made machine parts carriers.

# YOUNGSTOWN BRIGHT BASIC WIRE

## *now used to fabricate stronger, longer-lasting materials handling baskets*



All-wire baskets are designed to safely transport many different type machine parts.

OLD-FASHIONED wooden trays and boxes used for handling expensive machine parts during production operations are on the way out. Today, industry is turning to modern all-wire baskets to safely perform this important function.

For fabricating their brand of all-wire carriers, Detroit's Mid-West Wire Products Company uses Youngstown Bright Basic Industrial Quality Wire. They find it forms easily—but gives the required stiffness and strength needed in the finished baskets. It spot-welds fast and sure for permanent, strong construction.

Youngstown Bright Basic Industrial Quality Wire is quality-controlled through all stages of production from ore mining to final drawing. This guarantees a wire free from both injurious seams and piping, laps, die marks, internal tearing and cupping. Why not make it your specification?

For further information or metallurgical assistance, write or phone today to your nearest Youngstown District Sales Office.

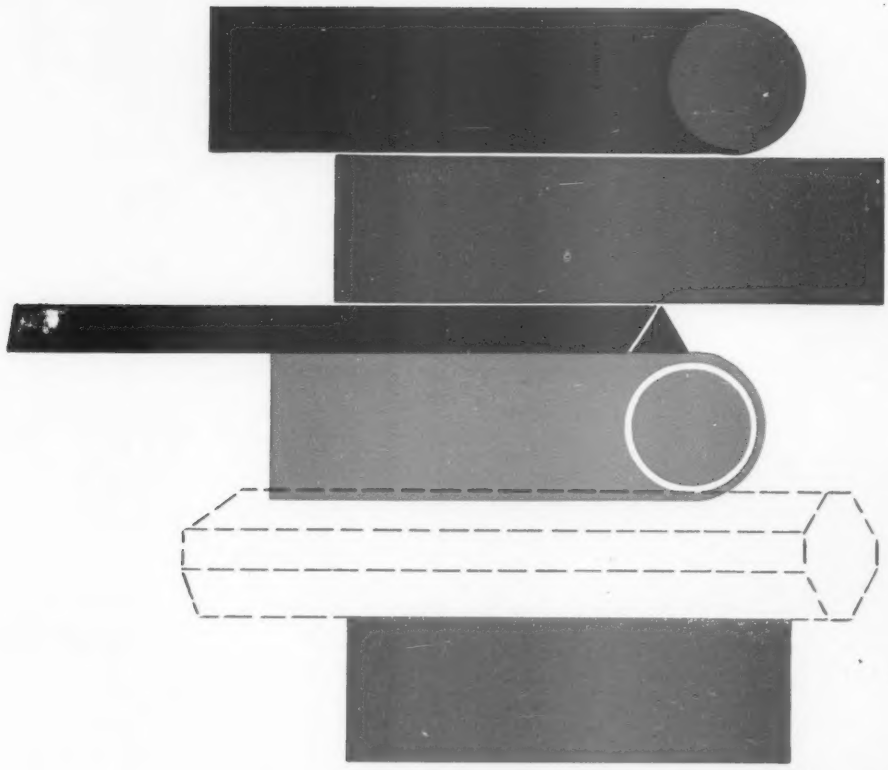
QUALITY YOUNGSTOWN SERVICE

**THE YOUNGSTOWN SHEET AND TUBE COMPANY**

*Manufacturers of Carbon, Alloy and Yoloy Steel*

General Offices - Youngstown 1, Ohio

District Sales Offices in Principal Cities



*tightly wraps bars, coils and tubing*

# *"Arksafe" spiral wrap*

"Arksafe" creped spiral wrap absorbs shocks and temporarily gives under the "pull" of modern high speed wrapping machines. In returning to its original shape it tightly wraps your coils, bars and tubing.

Each roll of "Arksafe" crinkled spiral wrap has a percentage of stretch to provide the maximum yardage without sacrificing the strength needed to properly protect your products.

There's a size and construction for your particular needs for use on your present equipment.

Specify "Arksafe"—made by the originators of crinkled kraft for industrial use.

EST. 1896

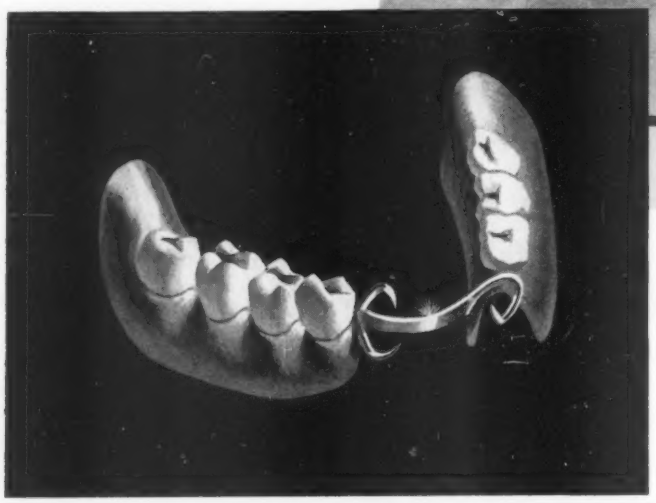
**ARKELL SAFETY**

**BAG COMPANY**

10 EAST 40th STREET, NEW YORK 16, N. Y. · 6345 WEST 65th STREET, CHICAGO 38, ILL.

PLANTS: CHICAGO, ILL. · NEWPORT NEWS, VA.

# FROM DYNAMOS TO DENTURES



Whether used for manufacturing the miles of wire in generators, or for the millimeters in a dental bridge, SYNCRO machines the world over are foremost along the profitable production lines.

Wire for any purpose — to help generate electrical energy or to help develop human energy — must be exactly **right**, and the machinery that makes it must be exactly right, too.

Superiority of design and manufacture, plus economy in performance are the acknowledged SYNCRO trademarks of quality. SYNCRO designers, engineers, machinists are never satisfied; they strive constantly for improvement. Keeping on top of challenges has kept SYNCRO performance on top of the world.

Look **first** to SYNCRO's experience for smooth performance and high profits.

SYNCRO®

**SYNCRO MACHINE COMPANY**

Perth Amboy, New Jersey, U.S.A.

affiliated company: WINGET SYNCRO Ltd. Rochester Kent, England

*Better Machinery for the Wire Industry*

WIRE DRAWING MACHINES • DIE STRINGERS • CONTINUOUS ELECTRIC ANNEALERS • PAYOFFS • CAPSTANS • WIRE INSULATORS • HEAVY DUTY TAKEUPS • TAPERS • SPECIAL MACHINERY

# WIRE AND WIRE PRODUCTS*

Reg. U. S. Pat. Off.

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable.

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 32 January, 1957 No. 1

Designated as Official Publication By The Wire Association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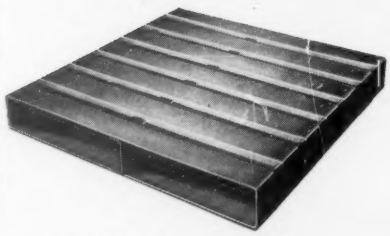
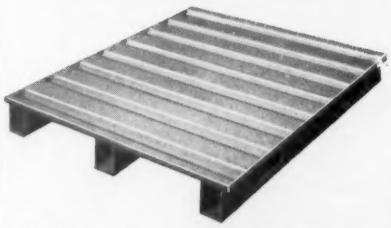
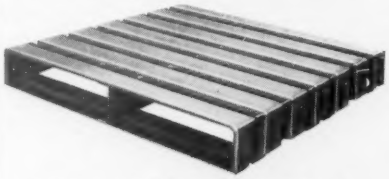


P-14 Double Face Steel Pallet.



P-12 Single Face Steel Pallet with two- or four-way entry.



P-16-S Semidouble Face Steel Pallet for use with trucks with retractable wheels as well as fork-lift trucks.

**REPUBLIC STEEL**

# Pallets

**GIVE YEARS OF EFFICIENT SERVICE AT MINIMUM COST**

Republic Steel Pallets are designed to eliminate maintenance expense — designed to eliminate broken deck boards, protruding nails, split stringers and joint failures.

They are strong and rigid with minimum weight. There are no sharp edges or projections to damage materials being handled or to injure workmen.

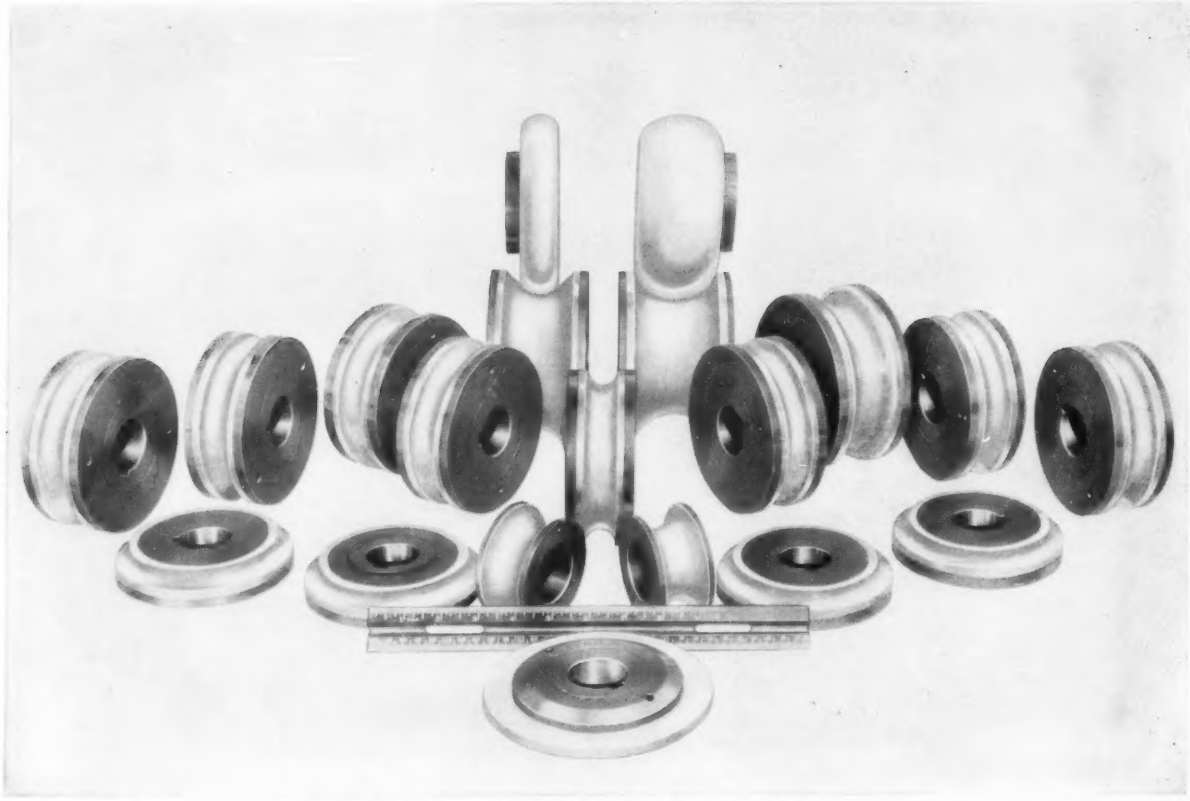
Pallet styles illustrated are typical examples only. Republic Engineers are available to work with you in the development of a pallet design to meet your individual requirements.

**REPUBLIC STEEL CORPORATION**
Pressed Steel Division
6102 Truscon Avenue, Cleveland 27, Ohio

( ) Please send Steel Pallet Catalog.
( ) Have an Engineer call.

Name_____ Title_____
Company_____
Address_____
City_____ Zone____ State_____

K-8767



Kennametal tube-forming rolls finished by Allied Manufacturing Co., Inc.

# Tube-forming rolls of KENNAMETAL* save 20 times their initial cost

- **outwear steel rolls 10 to 1**
- **improved product appearance**
- **greatly increased production**
- **less tube mill downtime**

One male roll of Kennametal was run for 345 days for the final form on a tube-forming mill. Upon removal for inspection, after producing 20,700,000 feet of tubing, the Kennametal roll was found to be in perfect condition. During that time, steel rolls in the mill were replaced every 6 to 8 weeks, with 2 to 4 days lost in downtime to replace rolls and line up the machine . . . or a loss of 60,000 feet in production per day of downtime.

The results of this test were so outstanding that all of the steel rolls on this operation were replaced by rolls of Kennametal which have been in continuous operation for over six months. With a life expectancy of at least ten to one over steel rolls, the Kennametal rolls are expected to pay for themselves within four months, with a total saving on the investment of over $450,000.

Other benefits: (1) the harder surface of Kennametal gives a higher finish and improved product appearance, (2) increased machine speed, permissible with Kennametal, makes greater production possible.

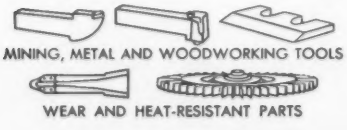
**Choose Kennametal for your tube-forming operations**

Kennametal's "90 Series" with six grades and the exclusive non-galling "80 Series" with three grades provide a range of grades to meet the specific requirement of practically any tube-forming die or wear part application. Kennametal sustains high production rates, maintains accuracy over extremely long production runs with a minimum of maintenance and machine downtime—all contributing to lower unit costs.

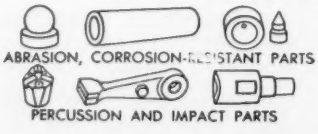
Choose Kennametal for your next die parts . . . for blanking, stamping, compacting, perforating, slitting, piercing, cold heading, swaging, forming, cupping, drawing. Kennametal die engineers will gladly work with you and your die maker in applying the right grade to meet your requirements. Call your nearest Kennametal office or write KENNAMETAL INC., Latrobe, Pennsylvania.

*Trademark

B-5933




INDUSTRY AND
**KENNAMETAL**
*...Partners in Progress*

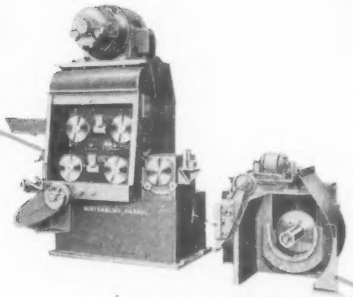


## *Over 60 Years Of Broad Experience As A . . .*

# SOURCE OF SUCCESSFUL WIRE MILL EQUIPMENT

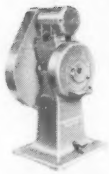
WATERBURY FARREL
FOUNDED 1851

String-Up Machines with Roll Pointers and Hand Swagers



Upright Cone Wire Drawing Machines
For Intermediate and Fine Wire Drawing

Horizontal Swagers

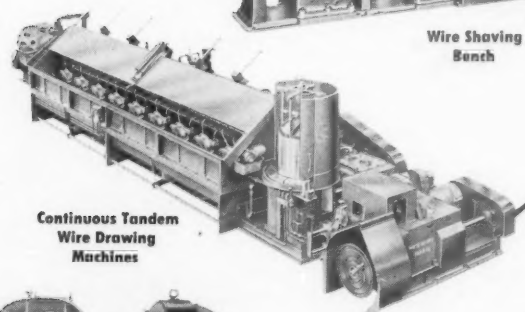


Rotary Swagers

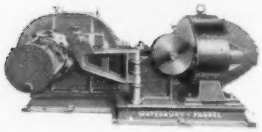
Vertical Bull Blocks

WF-35

Wire Shaving Bench



Continuous Tandem Wire Drawing Machines



Horizontal Bull Blocks

- BULL BLOCKS
- CONTINUOUS TANDEM WIRE DRAWING MACHINES
- HAND SWAGERS
- HORIZONTAL SWAGERS
- ROLL POINTING MACHINES
- ROTARY SWAGERS
- SLEEVE WIRE DRAWING MACHINES
- SPOOLERS
- STRING-UP MACHINES
- TRAVERSING WINDERS FOR FLAT WIRE
- UPRIGHT CONE WIRE DRAWING MACHINES
- WIRE FLATTENING MILLS
- WIRE SHAVING BENCHES

*Write for free bulletins on the specific types of machines you are interested in.*

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THE WATERBURY FARREL FOUNDRY & MACHINE CO.
Waterbury, Conn., U. S. A.
*Branch Offices: Chicago • Cleveland • Millburn, N. J.*

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Rolling Mill Machinery

Wire Mill Equipment

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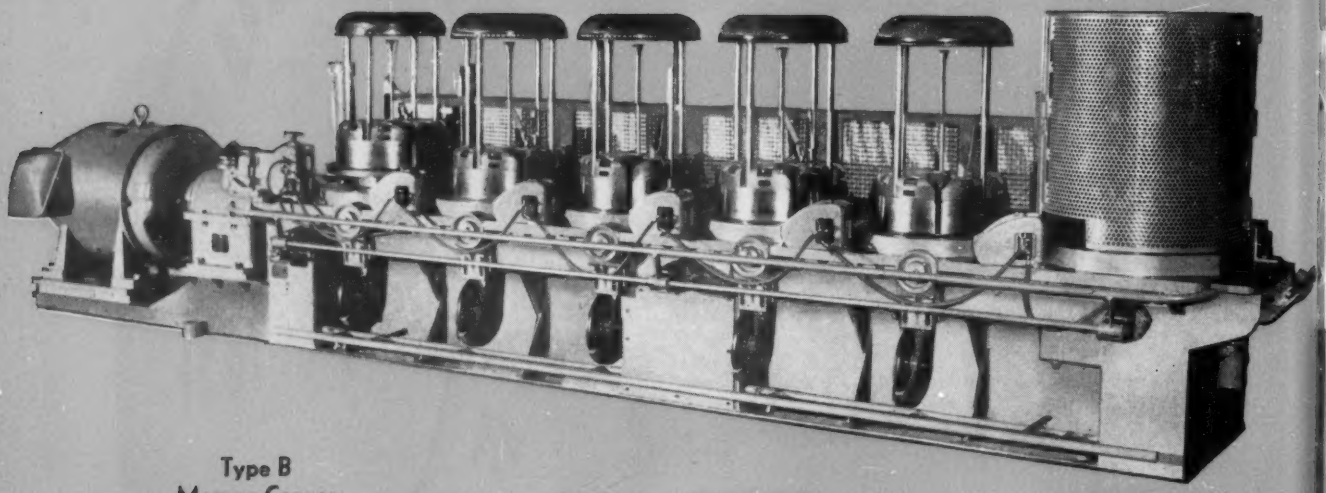
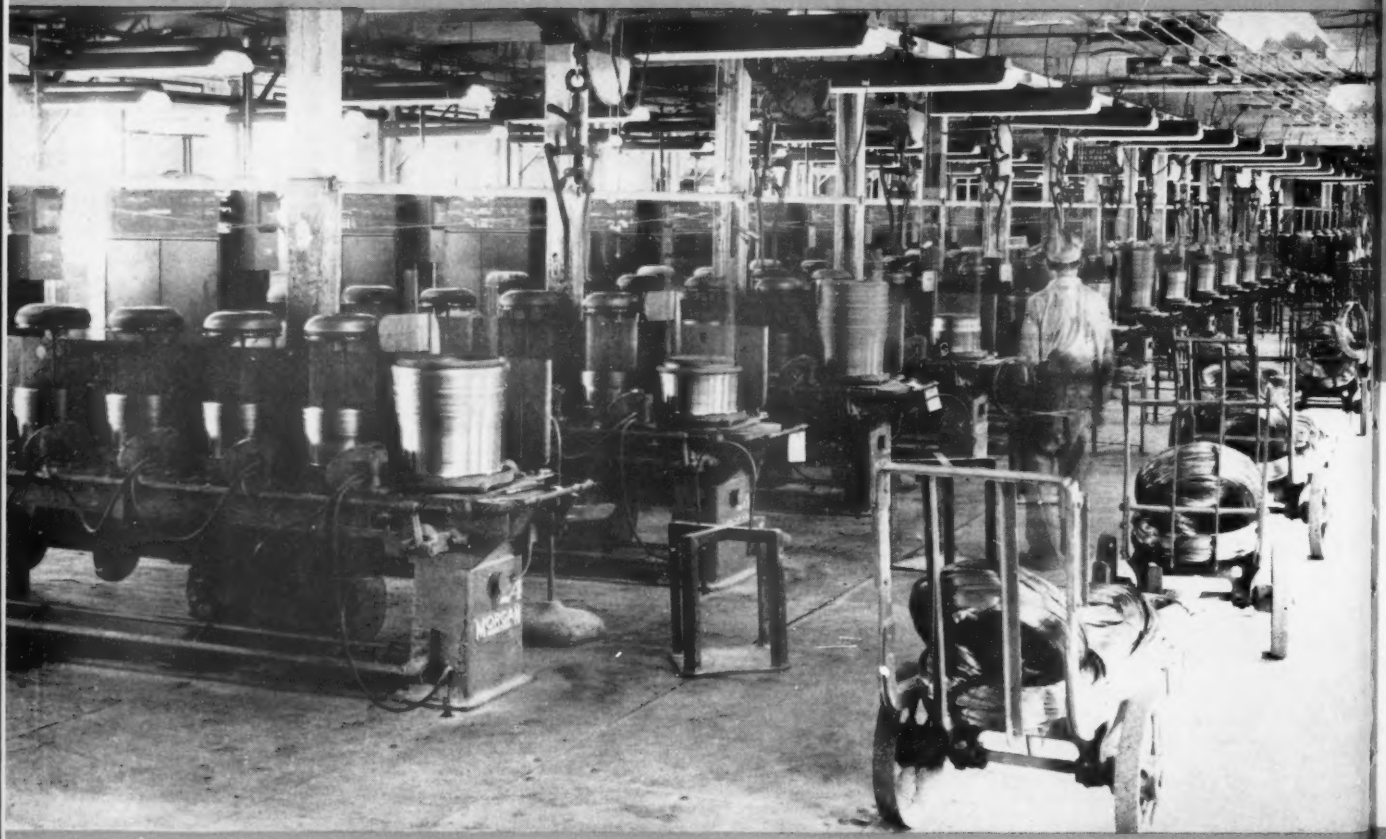


Type B
Morgan-Connor
Wire Machine



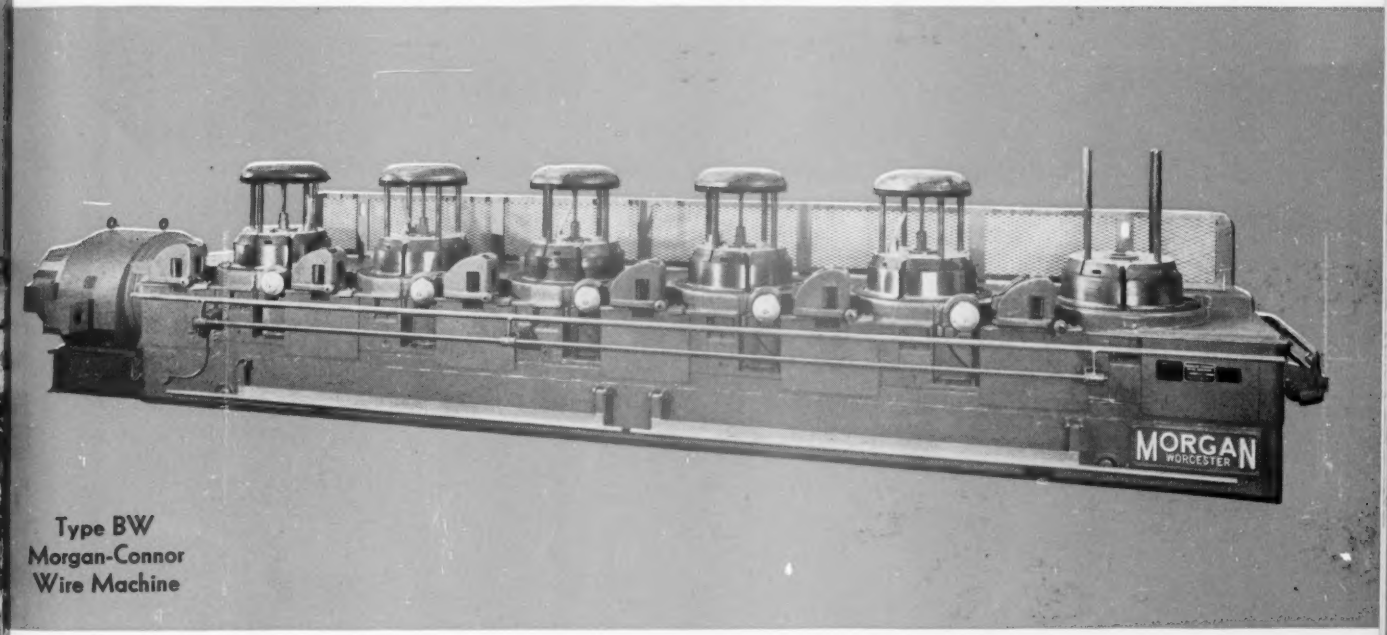
MORGAN-CONNOR MACHINES IN ACTION DRAWING LOW-CARBON WIRE

# MORGAN-CONNOR
## WIRE MACHINES

NON-SLIP — DRY — CONTINUOUS — COOL

Low Power Cost—Low Die Cost

Low Space Requirement—High Production




Type BW
Morgan-Connor
Wire Machine

WIRE MACHINES • WIRE BLOCKS

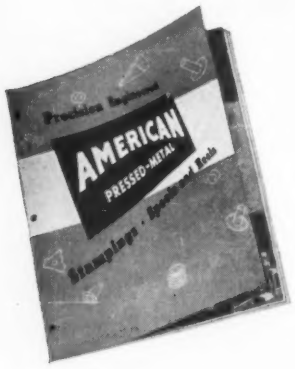
BULL BLOCKS • DEAD BLOCKS

TAKE-UP FRAMES

WIRE MILL ACCESSORIES

**MORGAN CONSTRUCTION COMPANY**

WORCESTER, MASSACHUSETTS




Send for your free copy of our latest bulletin on American Pressed-Metal Spools and Reels. It contains full details and charts on the many standard types.

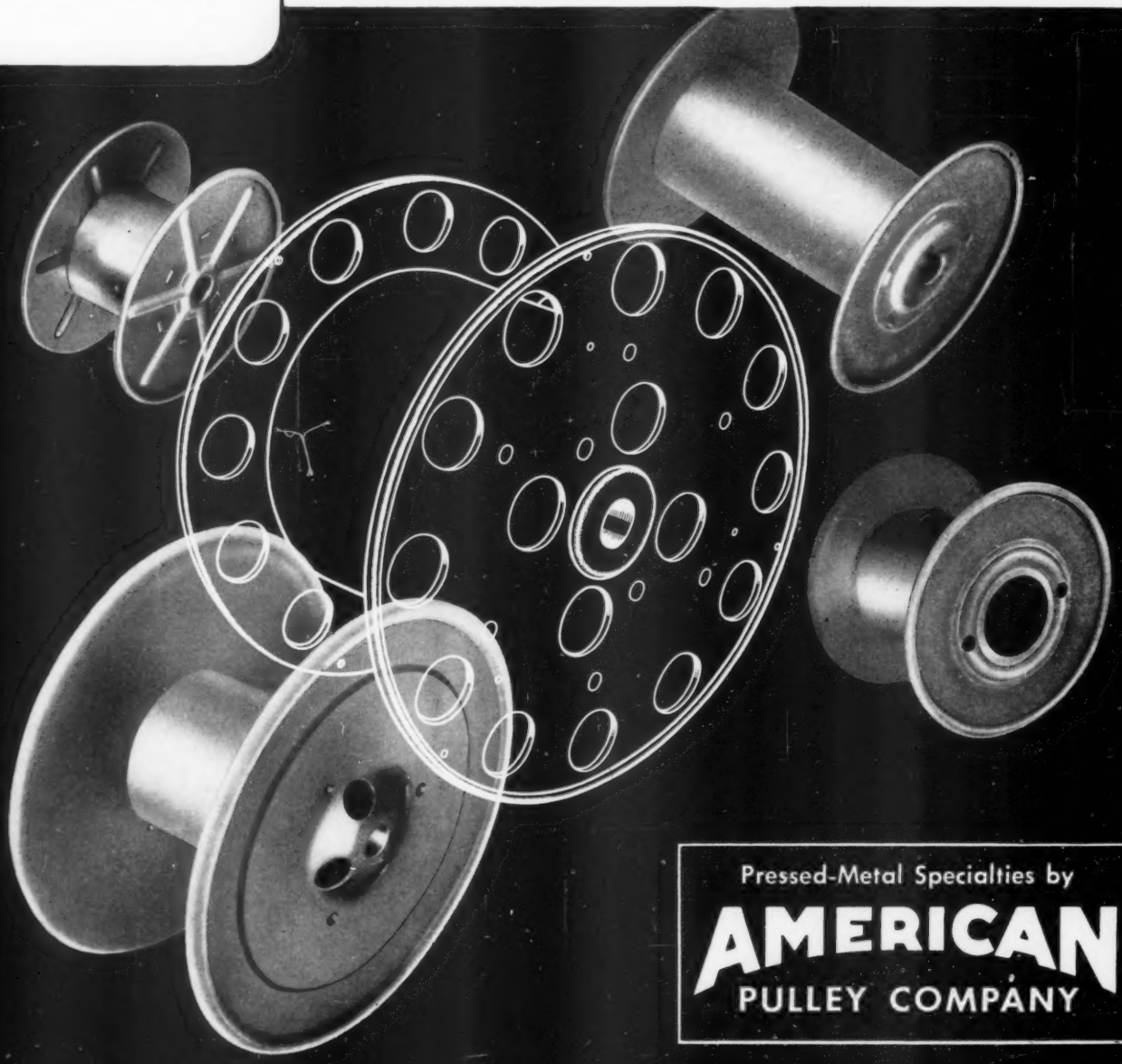
# For shipping or processing spools and reels get exactly what you want from American Pulley

Name your need . . . there's an American pressed-metal reel or spool to meet it. And if our long list of standard sizes doesn't contain the model you need, we'll custom-build one to your exact requirements.

American pressed-metal spools and reels are practically indestructible—won't crack, chip or warp. They offer the added advantages of light weight, cleanliness and strength.

Almost 60 years' experience in design and manufacture—plus a vast assortment of tools, dies and other facilities for making all types of spools and reels to strict custom specifications—are at your service.

Send us your specifications, blueprints or merely tell us what you need and we'll design from scratch. You'll find our quotations fast, realistic and offering you good value for the money. The American Pulley Company, 4242 Wissahickon Ave., Philadelphia 29, Pa.



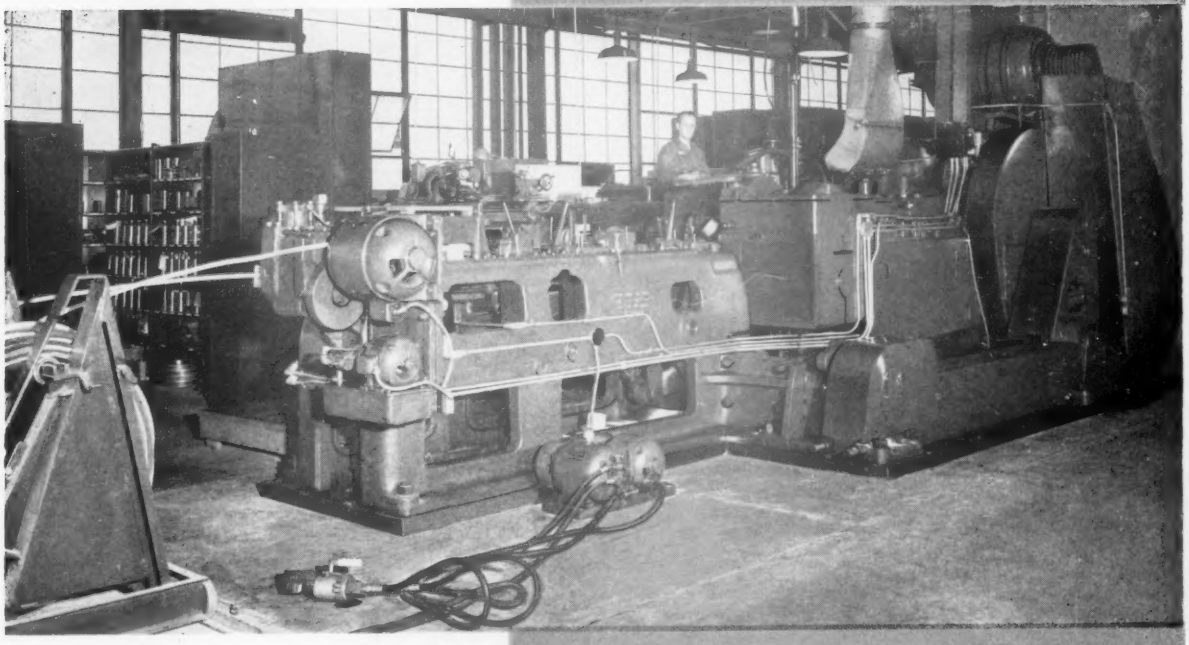
Pressed-Metal Specialties by

**AMERICAN**

**PULLEY COMPANY**

# Ajax-Hogue Wire Drawers

## Built in Eight Sizes *for* All Cold Headers



*Courtesy of Lake Erie Screw Corp., Cleveland, Ohio*

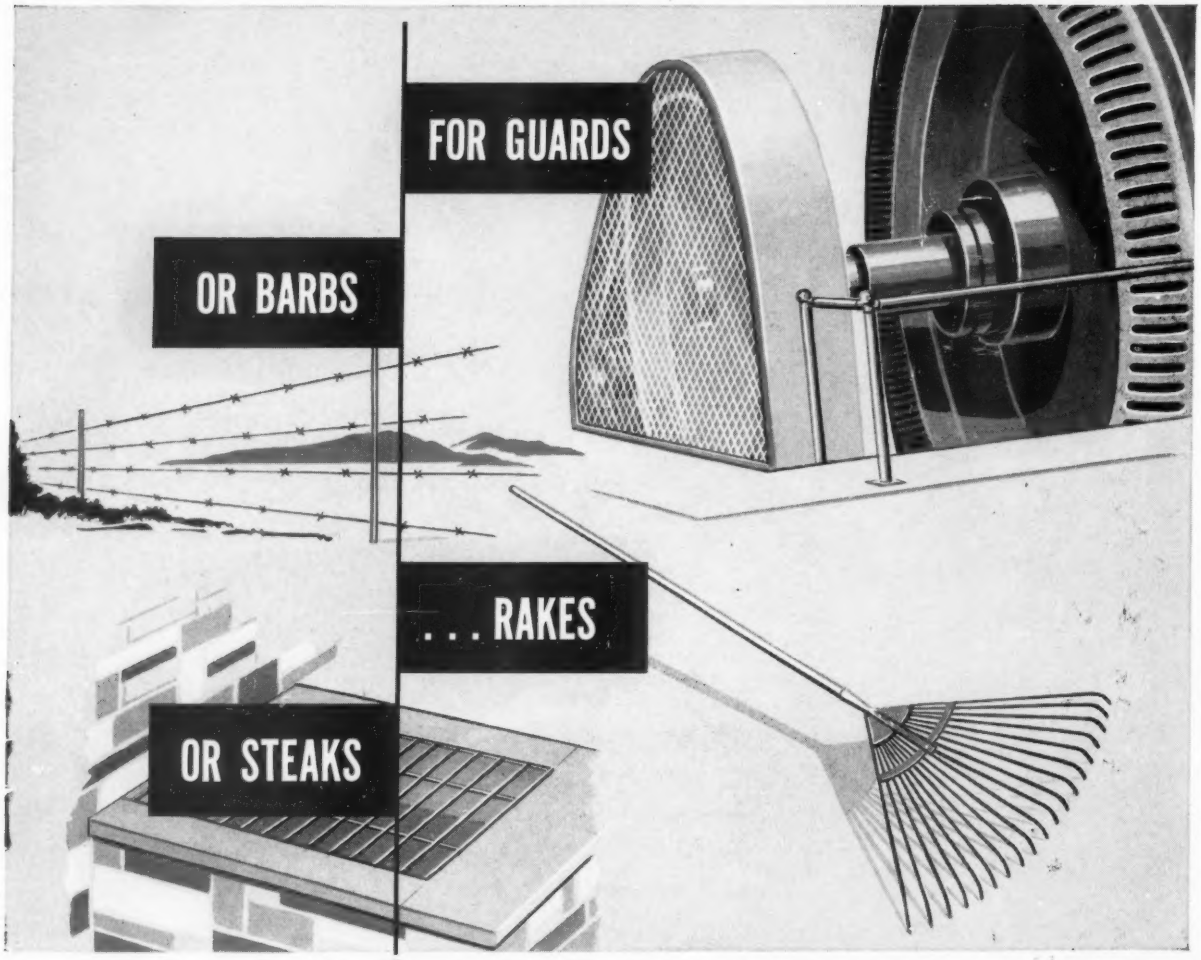
AJAX-HOGUE WIRE DRAWERS Can be attached to any make Cold Heading Machine with which we are familiar.

It is a complete Wire Drawing unit driven from the header by roller chain. Built in eight sizes, it can handle all diameters of rod from the smallest available, namely No. 5 size rod up to a maximum of 1½" diameter.

**LOWER MATERIAL COSTS**
**IMPROVED PRODUCTS**
**LONGER DIE LIFE**
**CLOSER WIRE TOLERANCES**
**STRAIGHT WIRE BLANKS**

• *Write for Bulletin No. 111-A* •

THE **Ajax** MANUFACTURING COMPANY
EUCLID BRANCH P. O. CLEVELAND 17, OHIO
110 S. DEARBORN ST., CHICAGO 3, ILLINOIS
W. P. WOOLDRIDGE CO. • BURLINGAME, CAL. • LOS ANGELES 22, CAL.




**PROMPT COURTEOUS SERVICE on these and other versatile Soaps:**

**WHITE RIBBON POWDER.** White Ribbon Powder in the 41-42° titer range is used by many particular customers as an all-purpose wire drawing compound. Contains 92% anhydrous soap.

**FLEXAL W. D. POWDER.** Scientifically designed for cold drawing phosphate coated stock.

**#559 POWDER.** For wet drawing of fine wire products. Will remain fluid and completely free flowing in solution at room temperature.

**#5055 WIRE DRAWING COMPOUND.** An improved metallic soap for difficult draws on a wide range of high and low carbon steel stock.

**Swift**
102 ND YEAR

*To Serve Your Industry Better*

# SWIFT'S SOAPS

## are the efficient lubricant for wire drawing

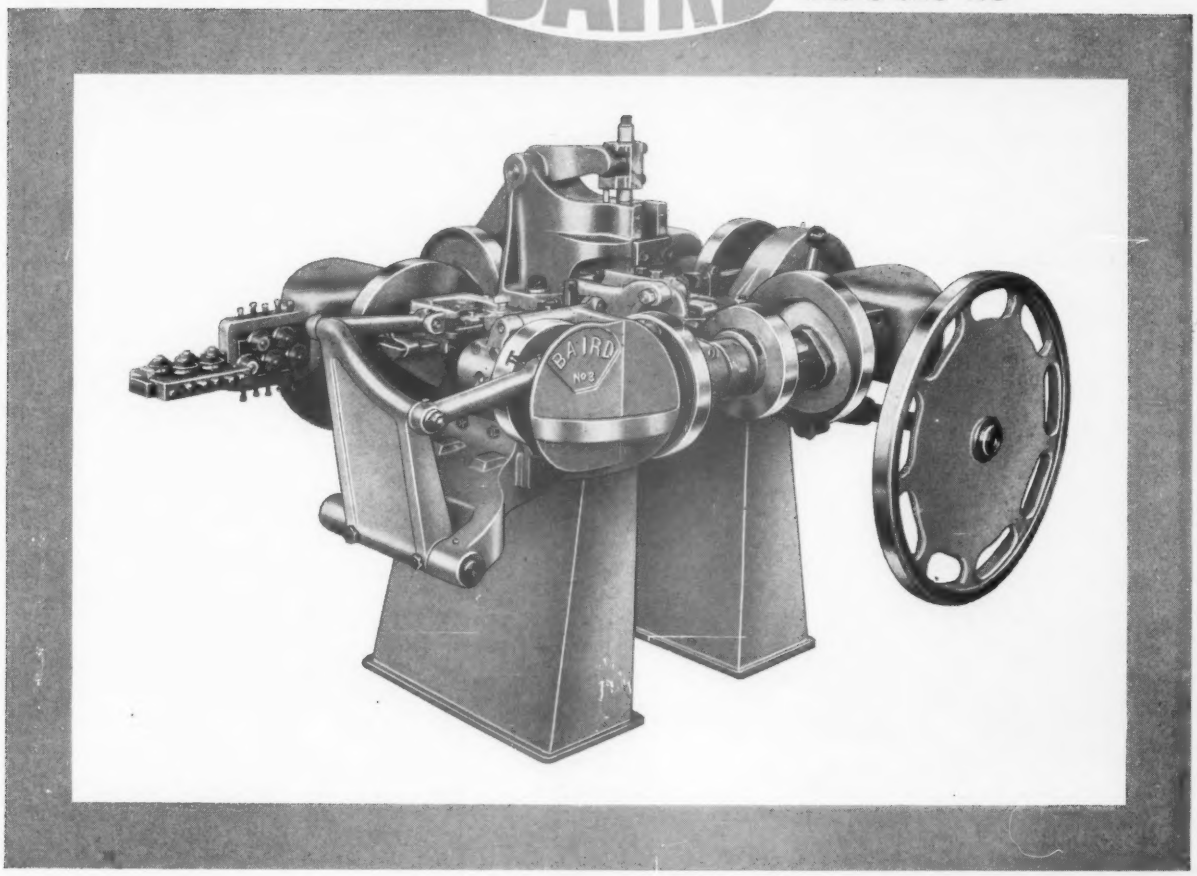
Wherever the demand for increased production of smoother, brighter wire drawn products exists you'll find Swift's soaps helping to make the *most* of speed and the *least* of heat and stress. A versatile line of efficient, dependable drawing lubricants such as those listed at left are available for immediate delivery from strategically located Swift & Company distribution points throughout the U.S. and Canada. With them, you need never compromise the efficiency you have invested in high-speed drawing equipment.

Write for details on a trial order today . . . see for *yourself* how a truly efficient drawing soap can help extend die life *and* help increase production. Remember too that—

ONE TRIAL IS BETTER THAN A THOUSAND CLAIMS

**SWIFT & COMPANY, Soap Department, Chicago 9, Illinois**

# ...ask BAIRD about it




## The "hidden bargain" in a BAIRD Four-Slide

Thousands of Baird Four-Slide users . . . making everything from auto seat springs to bobby pins . . . say it isn't hard to find.

The "hidden bargain" is the cost-reduction know-how that goes along with every machine sold.

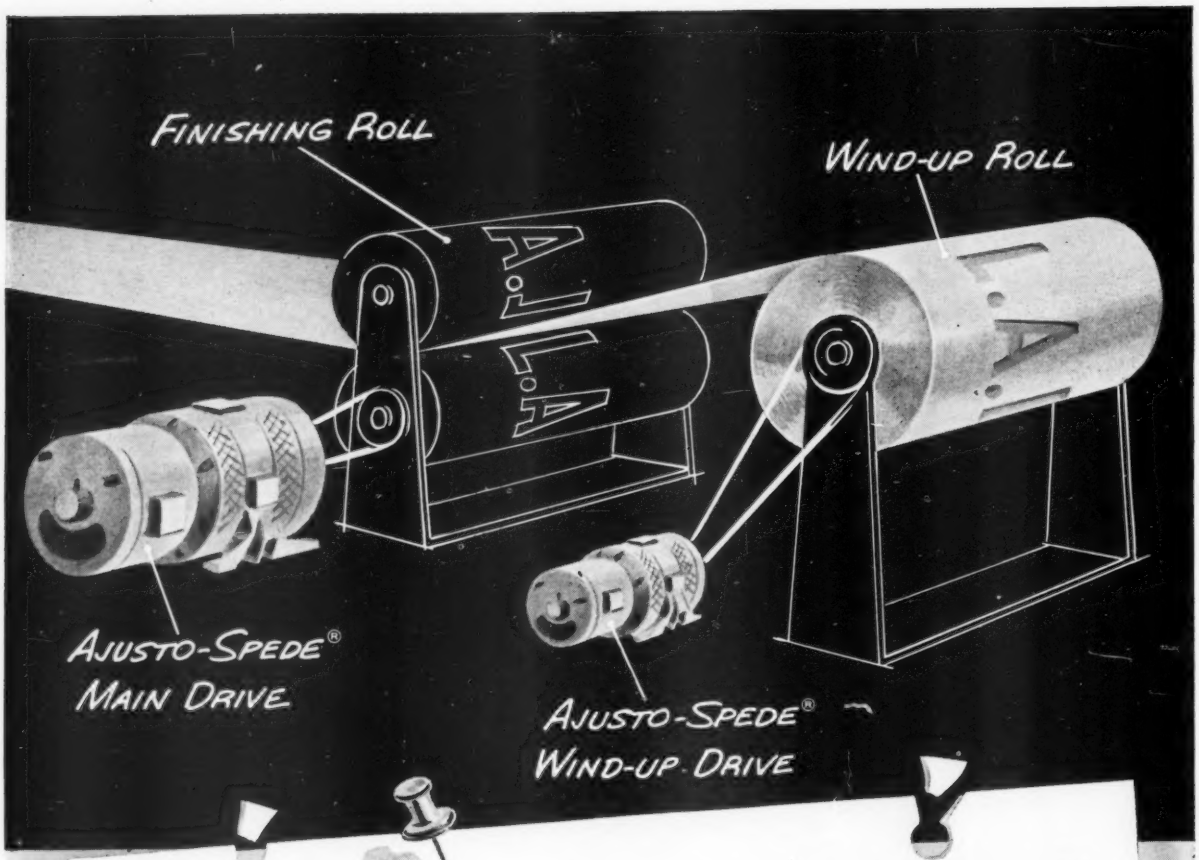
Baird pioneered the four-slide machine as the basic round and ribbon wire forming equipment used by every industry making such products. Baird has the most extensive experience files on tooling for this most versatile of high production equipment. Usually the problem that seems tough to the customer can be matched to a previous successful Baird application . . . thereby saving time and money in tooling.

With such a reservoir of past practical experience to draw upon, it's always good business to "ask Baird about it" when a four-slide application is being considered. Our range of standard automatic wire forming machines is complete, from the "bench top" No. 00 (400 lbs.) to the "room size" No. 8 (12,000 lbs.) . . . also two standard sizes of ribbon metal forming machines. Bulletin on request. Write Dept. WP.

AUTOMATIC MACHINE TOOLS • AUTOMATIC WIRE & RIBBON METAL FORMING MACHINES • AUTOMATIC PRESSES • TUMBLING BARRELS

**THE BAIRD MACHINE COMPANY**
STRATFORD CONNECTICUT

1BA56




# Do you have a Wind-up Problem?

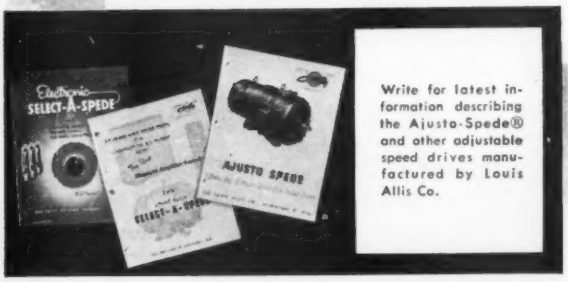
## The Louis Allis Ajusto-Spede® Drive gives you the best answer

The Ajusto-Spede® drive has solved many difficult wind-up problems--has successfully handled a wide range of materials from cigarette paper to steel. Just look at the versatility of this drive--what it can do for you:

- Linear speed range from 100 to 2000 fpm.
- Roll build-up ratios up to 15:1.
- Tensions from 1/2 lb to 10 lbs per inch of width.

But that's not all. No dancer roll is required. An AC signal generator, mounted on the main drive, corrects for changes in linear speed. A special circuit provides inertia compensation during periods of acceleration or deceleration. Adjustable stalled tension is also provided.

Don't let your wind-up problems throw you. Consult your Louis Allis field engineer--he has the drive and he also has engineering experience in applying these drives that can help you.




Write for latest information describing the Ajusto-Spede® and other adjustable speed drives manufactured by Louis Allis Co.

AS-102

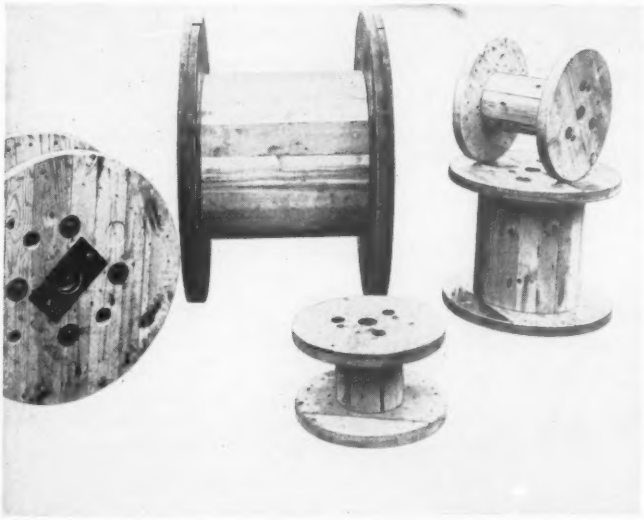
**THE LOUIS ALLIS CO.**
MILWAUKEE 7, WISCONSIN

# SAVE with..

# NON-RETURNABLE

## WOOD shipping REELS...

for all sizes and types of Electric Wire and Cable



**Look at these advantages:**

- *Reduced Reel Investment*
- *Less Storage Space*
- *Lower Freight Costs*
- *No Repair Costs*
- *No Return Freight Costs*
- *No Bookkeeping*
- *No Cash Deposits Req'd.*
- *No More Headaches ! !*

NON-RETURNABLE REELS ALLOW DEFINITE PACKAGING COSTS.

HIGH SPEED

**SHIPPING SERVICE in our . . . OWN TRUCKS**

within a radius of 200 miles from the plant. Fast freight will bring you Bridge reels in 5 days or less east of the Mississippi.

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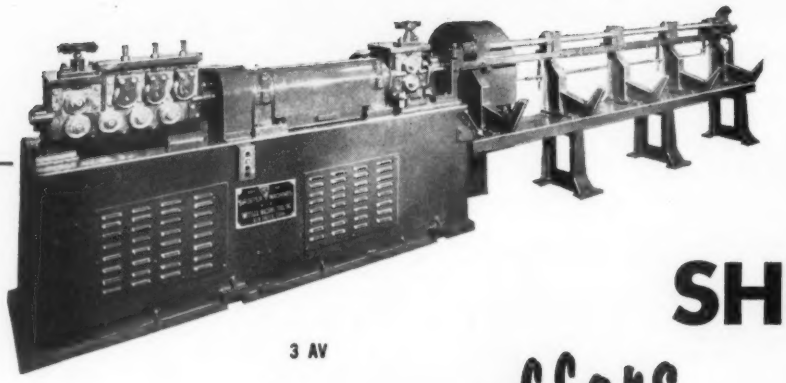
*"REEL GOOD . . .*

Let us quote on your reel needs. Send your specifications. Better yet, visit our plant and see how and why our reels are made so well at so low a cost.

*WOOD REELS"*



3 AV

90th year

# SHUSTER offers most!!

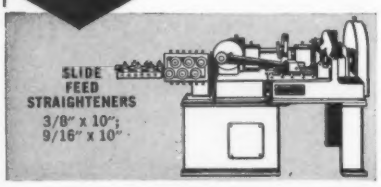
In Wire Straightening and Cutting, SHUSTER variable speed machines consistently provide the newest tested principles of operation – SHUSTER'S 90 years' know-how will cut your wire straightening and cutting costs every day!

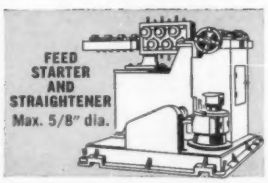
| | SHUSTER | Manufacturer B | Manufacturer C | Manufacturer D |
|---|---|---|---|---|
| Infinite variable speed of all feed and cutoff ranges | YES | NO | NO | NO |
| Electrically controlled Target and Clutch | YES | Some Models | NO | NO |
| Power Consumption | LOW | HIGH | MEDIUM | HIGH |
| Complete On-The-Job Engineering service | YES | NO | NO | NO |
| Flat and Shape Stock Machines available | YES | YES | NO | NO |

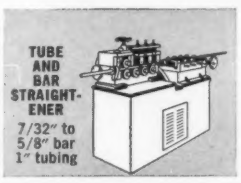
**SHUSTER** – the *first* name (since 1866) in Wire Straightening and Cutting, offers *more* production features, at less investment and operating cost, than have ever been available in the field!

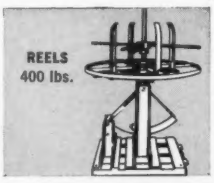
**METTLER**
**MACHINE TOOL, INC.**
155 West Adeline Street, New Haven, Conn.

**This too is SHUSTER.**



it's **easy** to remember
this trademark...

and remember...

it's **easy** to do business with **SCOVILL**

BRASS and ALUMINUM
MILL PRODUCTS

18SC56

**SCOVILL** Manufacturing Company, Mill Products Division
99 Mill Street • Waterbury 20, Connecticut • Phone Plaza 4-1171

it's **easy** now to recognize...

**superior quality of SCOVILL BRASS and ALUMINUM in these new packages.**

***strip and sheet*** BRASS . . . BRONZE . . . NICKEL-SILVER . . . PHOSPHOR BRONZE and ALUMINUM in a comprehensive range of commercial alloys, tempers, gauges and widths.

***rod and wire*** BRASS . . . BRONZE . . . NICKEL-SILVER . . . PHOSPHOR BRONZE in commercial alloys, shapes, tempers and sizes. Scovill ~~HIGH SPEED~~ (Free-Cutting) Brass Rod. ***Extruded*** Cold-Heading Wire (Cartridge Brass, 70%).

***tube products*** BRASS . . . BRONZE . . . CUPRO-NICKEL . . . COPPER . . . including SCOVILL HEAT EXCHANGER TUBE to meet standard specifications.

Many of these Brass Mill Products are made by Scovill's unique CONTINUOUS CASTING PROCESS, assuring exceptional SOUNDNESS and UNIFORMITY in the metal, an example of the unrivaled facilities and service that are as near as the telephone on your desk . . .

it's **easy** to do business with **SCOVILL**

BRASS and ALUMINUM
MILL PRODUCTS

**SCOVILL Manufacturing Company, Mill Products Division**
**99 Mill Street • Waterbury 20, Connecticut • Phone Plaza 4-1171**

*Are You Drawing Copper Wire Directly*

from .250" down to .0315"?

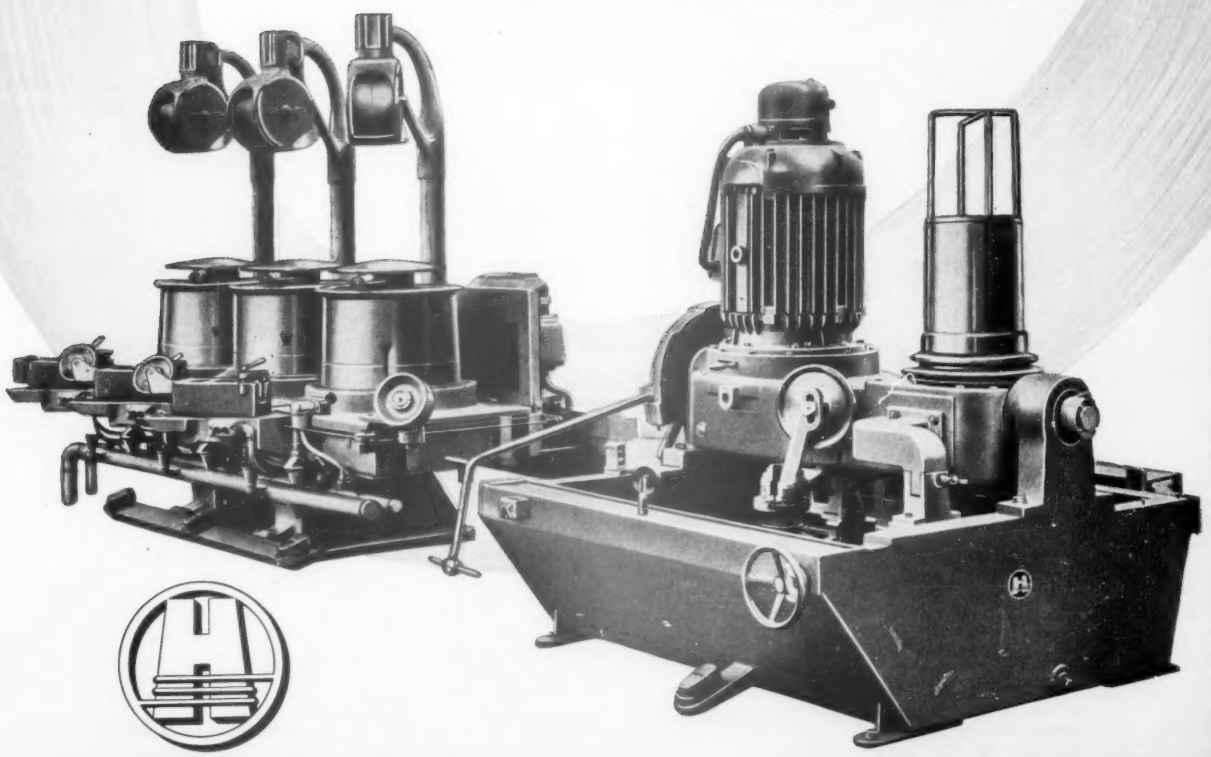
For this range, we recommend our

**NON-SLIP/SLIP WIRE DRAWING MACHINE MODEL G II/TF II D**

The advantages of this combination of machines are as follows:

1) Drawing proceeds without interruption in one operation
2) Lower costs through combination of two operations
3) Finished wire with bright, flawless surface

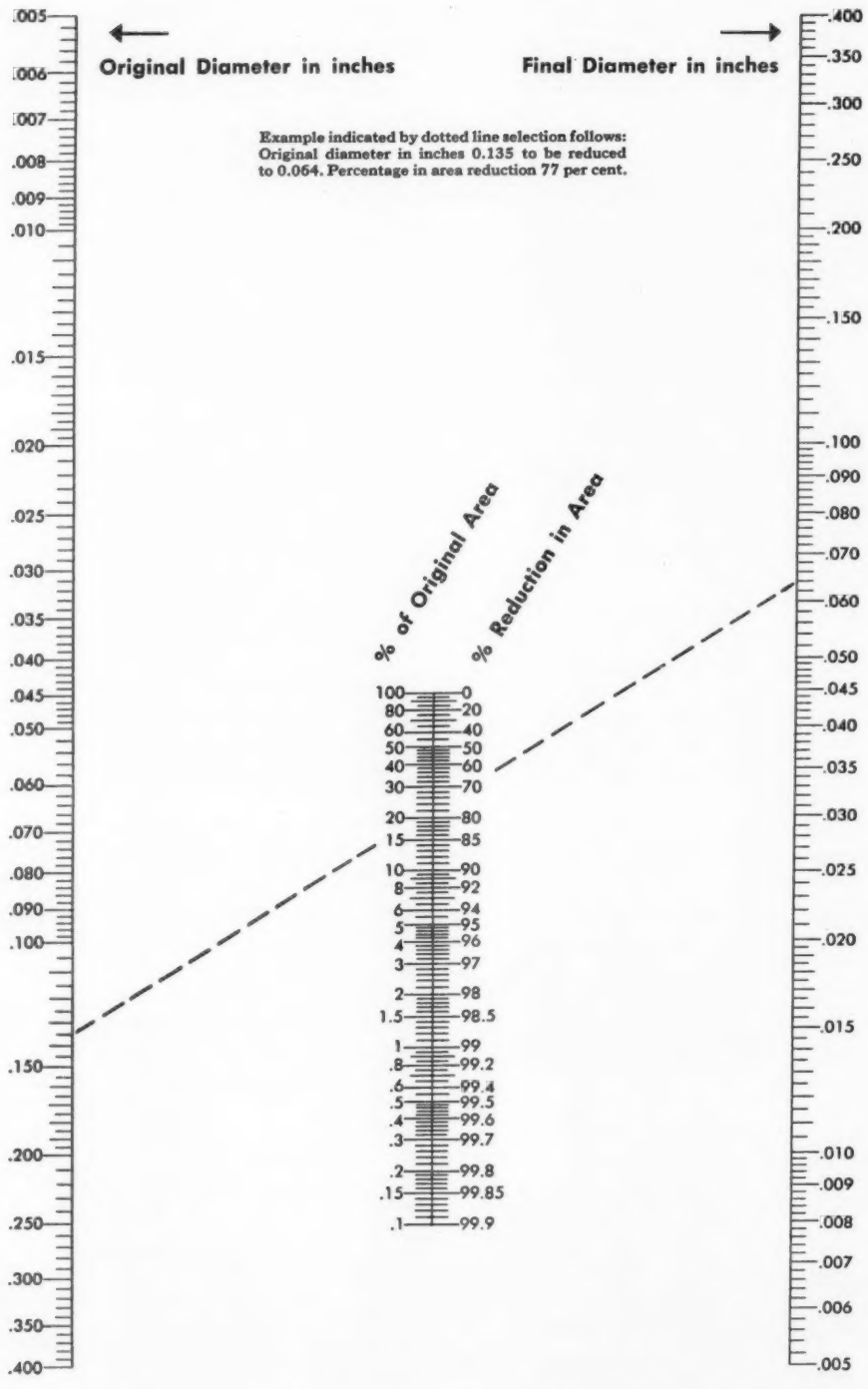
Please submit your inquiries, we shall be glad to quote on your particular wire drawing problems.



**MASCHINENFABRIK HERBORN** BERKENHOFF & DREBES A.-G. **HERBORN/DILLKREIS** GERMANY

Sole Representative in the U. S. A.:

**KURT ORBAN CO., Inc., 34 Exchange Place, JERSEY CITY 2, N. J.**




**ALUMINUM WIRE DRAWING NOMOGRAPH**

**This aluminum wire** drawing nomograph gives you a simplified method of calculating area reduction in per cent. We hope it will aid you in your work. Keep it handy for ready everyday reference.

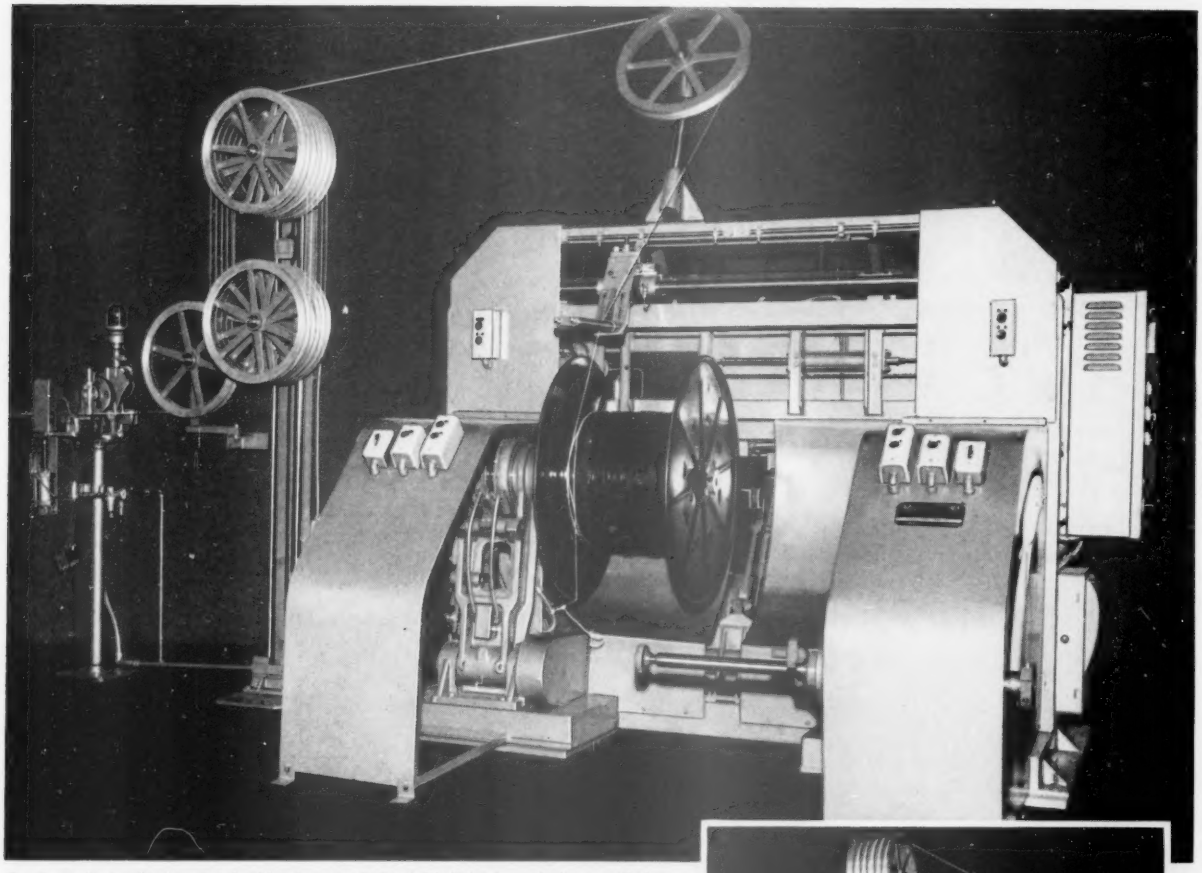
For immediate service and information call the Kaiser Aluminum sales office listed in your telephone directory. Or write to Kaiser Aluminum & Chemical Sales, Inc., *General Sales Office*, Palmolive Bldg., Chicago 11, Illinois; *Executive Office*, Kaiser Bldg., Oakland 12, California.

**Kaiser Aluminum**

Manufacturers Wire • Rivet Wire and Rod • Welding Wire • Redraw Wire & Rod • Spooled Fine Wire • EC (Electrical Conductor Grade) Wire

*See "THE KAISER ALUMINUM HOUR." Alternate Tuesdays, NBC Network. Consult your local TV listing.*

# NEW *ENTWISTLE* AUTOMATIC HEAVY-DUTY DUAL REEL TAKE-UP

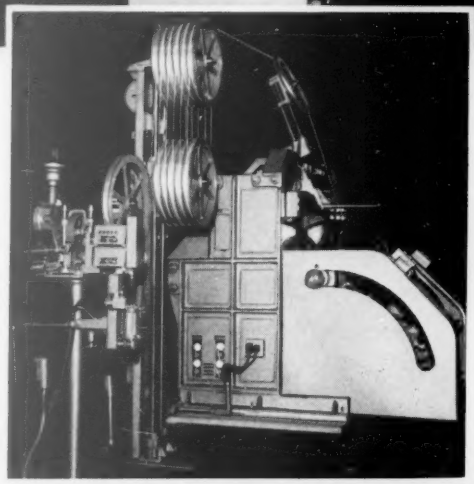


Constant wire tension is maintained by dancer unit (top left). Drive transmission uses timing belts, thereby eliminating chains, gears; reduces lubrication to a minimum. Retractable spindle (lower right) is hollow drive type, double row ball bearing mounted. Facilitates adaption of coiling heads, heavy reel handling.

## helps increase extruder line capacity, speeds production

The new Entwistle Dual Reel Take-Up Type THA-42 winds 1500 lb. reels with a wire dia. of .750 at 1000 FPM. It enables continuous winding of heavy gauge wire to reach a new high in production. The entire unit features many innovations of design which bring to extruder line production an ease of operation that is totally new.

Switch over to empty reel is accomplished without damage to insulation. Both wire and wire traverse lay are controlled by electric clutches and brakes. Because of larger reel capacity bigger reels can be used for shipment, storage problems are cut to a minimum. Find out what the new Entwistle Dual Reel Take-Up can do for your extruding operations. Contact us direct for complete details.



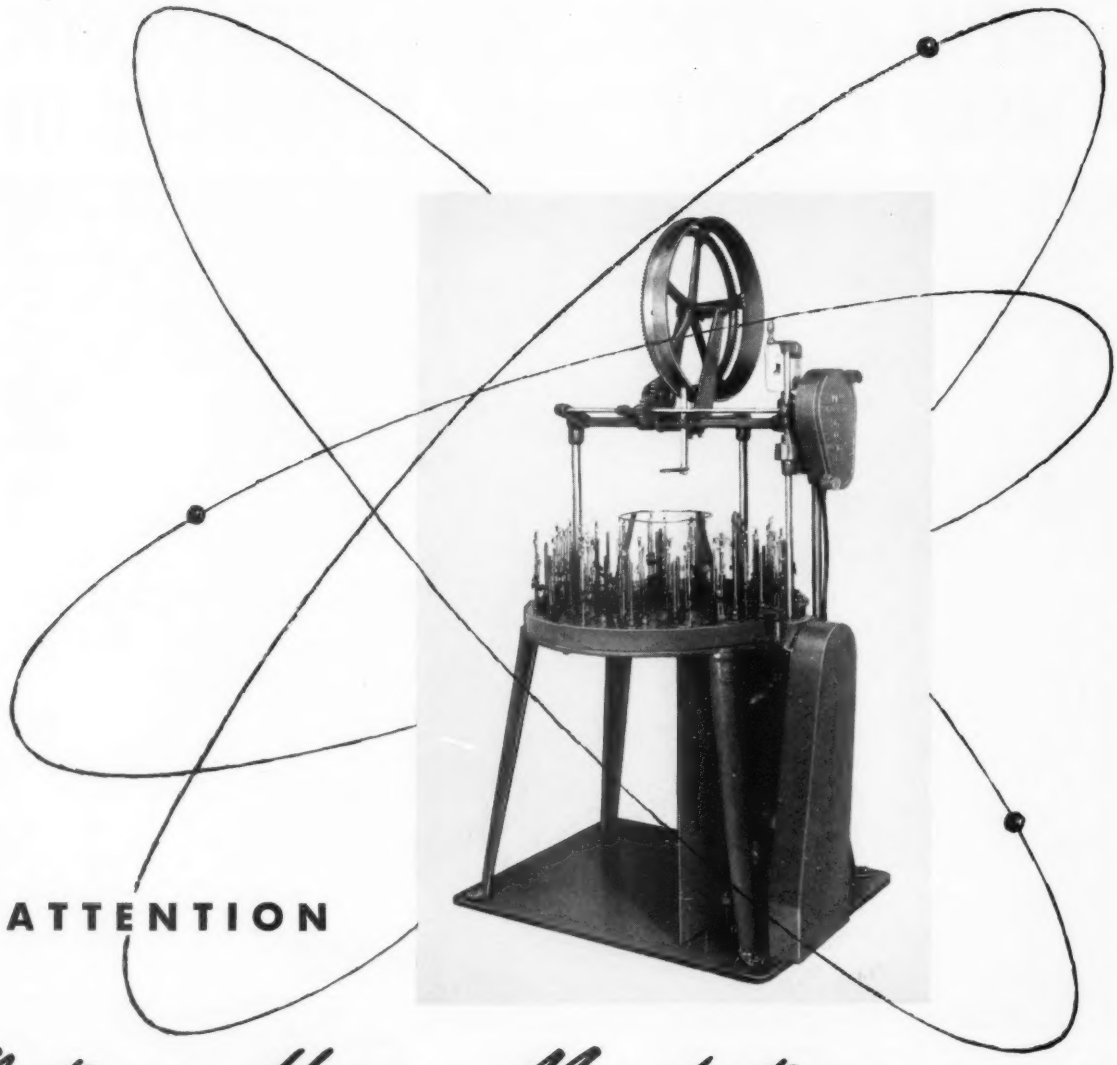
On left, pre-set electrical measuring unit controls quantity of wire to be wound. Pneumatic lifts lower full reels, lift empty ones into running position. Covered drives offer maximum safety. Entire unit is mounted on cast iron base.

**ENTWISTLE MANUFACTURING CORPORATION**

Plant and Executive Offices

1475 ELMWOOD AVE., PROVIDENCE 7, RHODE ISLAND

FORMERLY JAMES L. ENTWISTLE CO.



ATTENTION

# *Electronics Harness Manufacturers*

**NOW . . . YOU CAN SAVE** time, labor and money with this versatile, high speed Nebuttco Harness Assembly Braider. Here's why.

**TROUBLE-FREE OPERATION** . . . protective braiding ring prevents lead-off wires from snarling or tangling with mechanism when down braiding.

**WIDE RANGE OF SIZES** . . . Nebuttco Harness Assembly Braiders can be supplied with 16, 20, 24, 32, 36, 48 and 64 carriers for braiding harness in a wide range of lengths and diameters.

**MOTOR DRIVEN** . . . built-in, geared motor drive eliminates overhead pulleys . . . just connect to electric outlet.

**COMPACT** . . . self-contained unit.

Send harness samples or specifications, for complete information and recommendations.

## NEW ENGLAND BUTT CO.

DIVISION WANSKUCK COMPANY

304 PEARL STREET PROVIDENCE 7, R. I.

In England—James Day (Machinery) Ltd., 28 Maddox Street, London, W-1

BRAIDERS • CABLERS • TAKE-UPS • BUNCHERS • STRANDERS • TAPING MACHINES

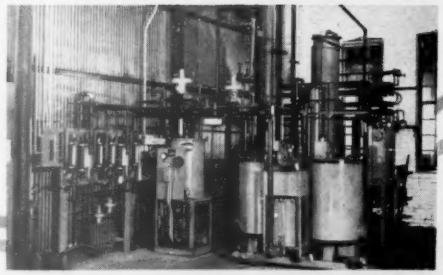
NEBUTTCO

*Typical charge of three stems of high carbon drawn wire.*

# High Convection Annealing

## FOR HIGH CARBON STEEL COILS

*Another Lee Wilson high convection wire annealing installation—two furnaces, three bases—charge size: 54" diameter, piling height, 90"*



*Nitrogen ga generating plant with gas drying equipment.*

***Special Lee Wilson high velocity dry nitrogen annealing system gives Kidd Drawn Steel highest quality high carbon wire and rod.***

Kidd Drawn Steel Company of Aliquippa, Pennsylvania, recently installed two special Lee Wilson high convection annealing furnaces to anneal rod and wire coils of the higher carbon analyses. SAE specifications numbers 1095, 52100, 6150, 8635 and 8650 are the usual type of steels that are processed with dry nitrogen gas to prevent any decarburization during the annealing cycle. Equipment is provided with means for carbon restoration cycles when required.

Lee Wilson® ENGINEERING COMPANY, INC.
20005 WEST LAKE ROAD • CLEVELAND 16, OHIO

HIGH CONVECTION ANNEALING FURNACES
MAKE THE BEST METALS BETTER

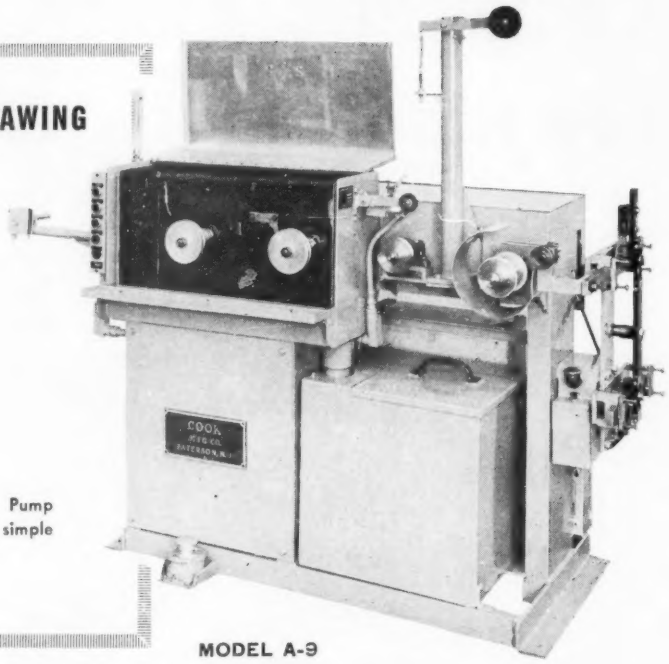
# A Complete, LOW-COST WIRE MILL...

## Model A-9 EXTRA FINE WIRE DRAWING

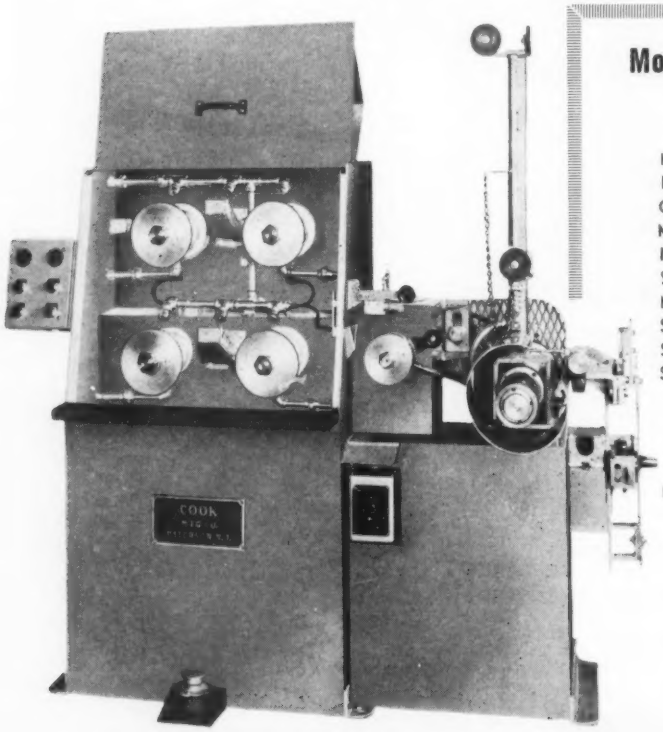
### Specifications:

| | |
|---|---|
| Maximum Wire Entering Size | #24 B&S Gauge |
| Size of Finished Wire | 33-44 B&S Gauge |
| Average Operating Speed up to | 4,000 ft./minute |
| Number of Dies | 9 |
| Maximum Die Case | 1" x ⅜" thick |
| Number of Drawing Shafts | 2 |
| Motor Size | up to 3 HP |
| Spool Capacity | 10 to 20 lbs. |
| Spool Diameter | 6" |
| Spool Traverse | 4¾" |
| Floor Space | 4'0" x 2'½" |

- A complete package with Drawing Solution Pump and enclosed Solution Tank. An extremely simple string-up process.



MODEL A-9



MODEL F-31

## Model F-31 MED-FINE WIRE DRAWING

### Specifications:

| | |
|---|---|
| Maximum Wire Entering Size | #14 B&S Gauge |
| Finished Wire Size | #26 to 34 B&S Gauge |
| Operating Speed | 5,000 ft./minute |
| Maximum Number of Dies | 16 |
| Number of Drawing Shafts | 4 |
| Size of Die Case | 1" x ½" thick |
| Motor Size | 15 HP |
| Spool Capacity | 40 to 90 lbs. |
| Spool Flange Diameter | 8" to 12" |
| Spool Traverse | 6" to 8" |

Trouble-free, round-the-clock service.

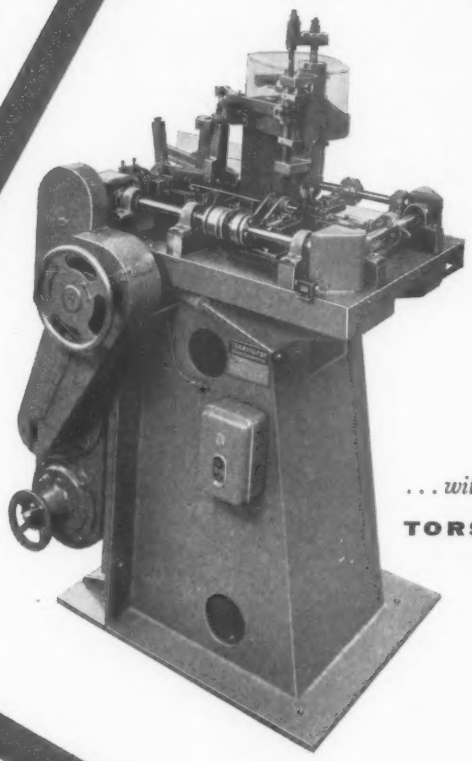
CANADIAN AGENT:
E. V. LARSON CO., LTD.
TORONTO CANADA

EUROPEAN AGENT:
CAPAMADJIAN LE MONNIER CIE LTD.
PARIS FRANCE

*A Complete Line of Quality Machinery For The Wire and Cable Industry To Meet Rigid Specifications.*

**COOK MANUFACTURING CO.** 50 EAST 25TH STREET, PATERSON, N. J. • ARmory 4-6380

# There's room for greater profits



*...with the NEW Torrington W3001*

**TORSION SPRING WINDER**

*Room* — room in which to work — is the outstanding feature of Torrington's new torsion spring winder. This modern, high production machine actually provides the largest tooling area ever devised. In addition, the W3001 offers many other advantages which will help spring-makers boost their production of torsion springs and reduce their costs at the same time.

*• Tooling area measures 12" by 18" • Tooling is faster and easier • Tools themselves can be made sturdier and more durable • Shafts on 3 sides plus vertical 2-slide attachment give great versatility in producing complex forms • Capacity extends to 10 turns of .080" wire, thus meeting the great majority of customer requirements for torsion springs • Rugged design means years of trouble-free operation with minimum downtime for maintenance and repairs.*

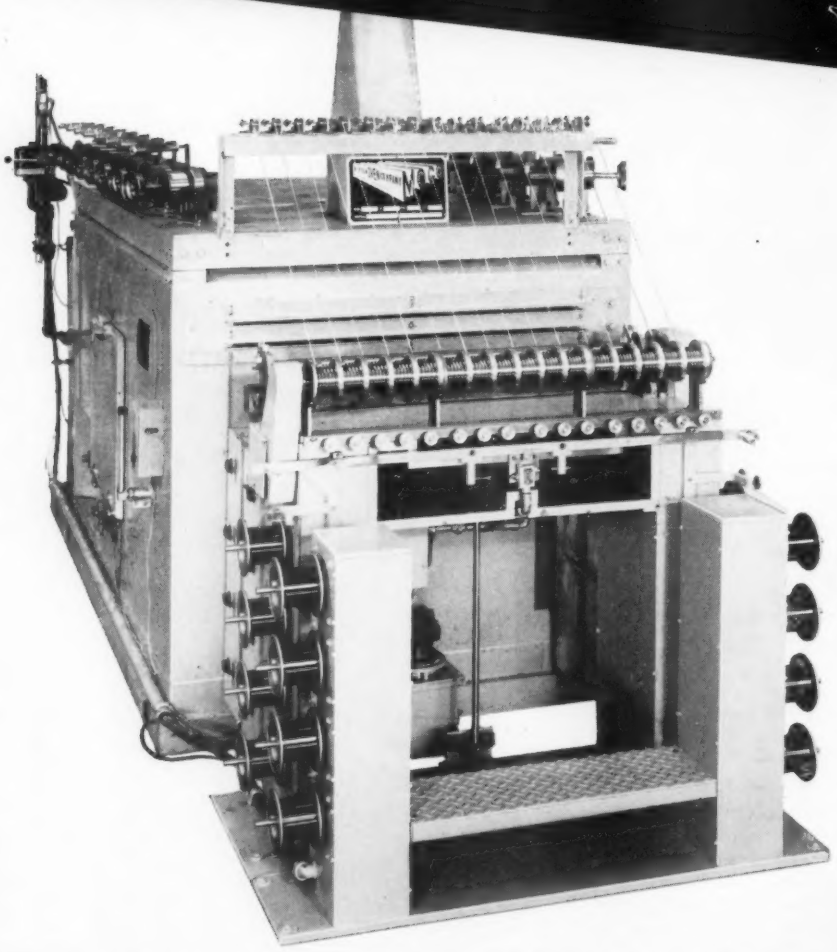
The Torrington Manufacturing Company has built more spring coiling machinery since 1937 than all other manufacturers combined. The knowledge and skill gained while serving spring makers during this period has now been used to create a torsion winder which we firmly believe is the finest ever offered to the industry. If you manufacture torsion springs, this new machine will give you faster, more efficient production and unprecedented versatility to meet your customers' most exacting needs.

Call or write, *now*, for full information.

THE
**TORRINGTON**
**MANUFACTURING COMPANY**
TORRINGTON · CONNECTICUT
WIRE FORMING MACHINERY DIVISION

ANOTHER ENGINEERING ACHIEVEMENT BY **MOCO**

# Now—A New Wire Enameling Machine That Produces MORE POUNDS OF FINISHED WIRE Per Hour with Commercial Grades of Varnish!



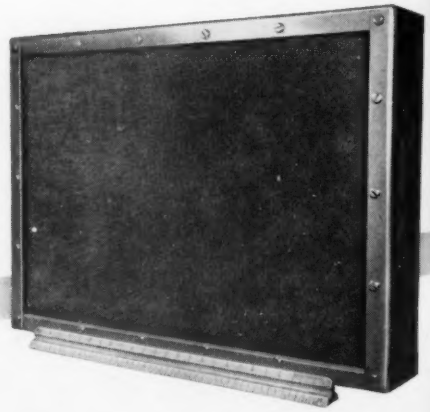
This type "B" wire machine handles wire from 31 A.W.G. to 42 A.W.G. Five other models complete the cycle—from the finest to the heaviest wire. The unique design of the horizontal, high volumetric, recirculating double-pass oven allows greatly increased production by rapid heat impartation and a high degree of temperature uniformity throughout the wire chamber. It is seven feet long inside, with an internal recirculating fan and fume consuming catalyst. The oven can be operated by either gas or electricity.

**For the first time, modern recirculating oven features—developed in recent years in the electrical manufacturing field—have been combined with the latest wire handling and coating machinery.**

**Here's a production capacity example: This machine consistently produces 16 heads of #33 A.W.G. with four or six coats of commercial, oleo-resinous or formvar enamels at wire speeds far in excess of 100 f.p.m.**

**Some of the leading wire manufacturers in the country have seen this machine in full operation in Detroit. They agree: It's a completely revolutionary development in the field of wire enameling equipment.**

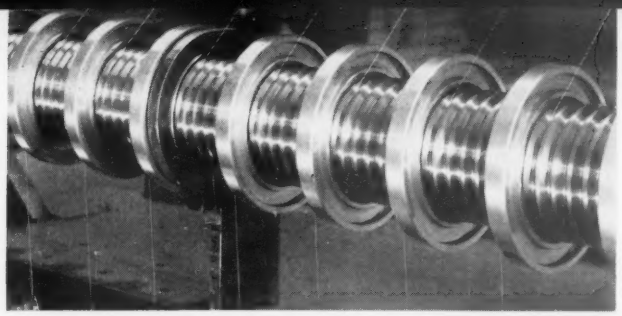
**Here, in picture-caption form, is part of the story. For complete information, fill in the handy coupon on the next page.**



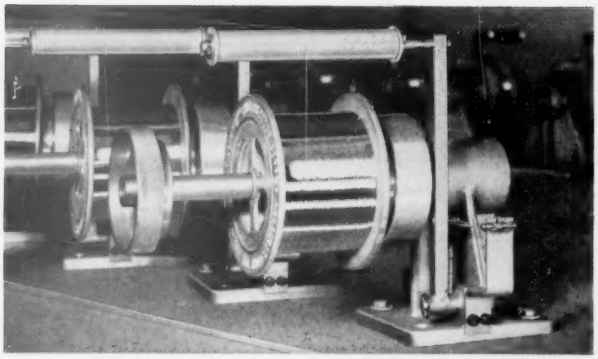
A catalyst is installed within the recirculating stream. Solvents are consumed as they are liberated. They are transformed into usable B.T.U.'s thus reducing the amount of energy from the heat source (either gas or electricity). Results: economy, odor-free exhaust, condensate free stacks, greatly reduced fire hazard.

MOCO

Photograph courtesy of Catalytic Combustion Co.

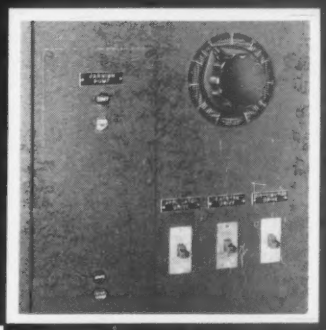


Each head of the wire capstan assembly is fitted with individual clutches at the capstan. Any or all of the lines can be started or stopped without affecting the remaining lines. Each strand is individually driven through the oven, lessening the overall tension applied to each line.

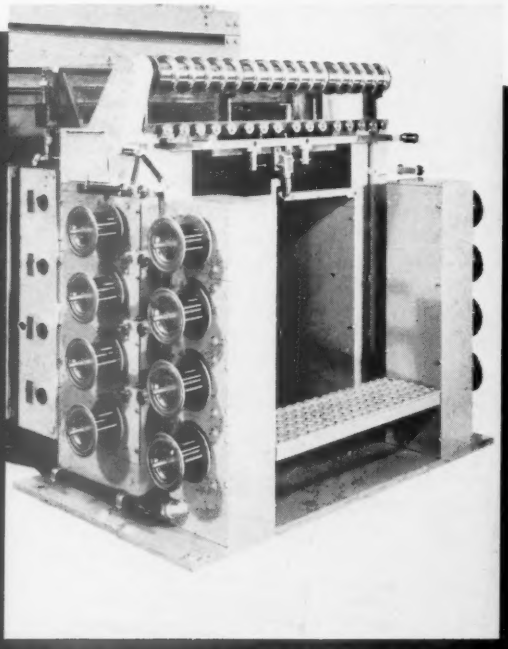


The bare wire pay-off mounts are rigidly mounted at a convenient operational height at the top of the oven. Wire tension is controlled by an automatic braking device.

The centrally located, efficient oven control panel makes operating the oven considerably easier. Experienced engineering has incorporated the ultimate in workmanship, simplicity and safety.



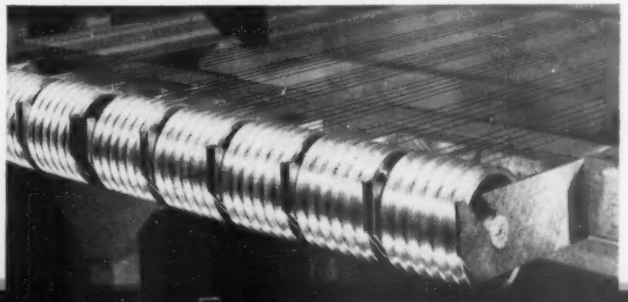
This finger-tip wire control panel brings the capstan and varnish handling equipment into a central point easily accessible to the operator.



The take-up spools on the unit console are driven by separate torque motors with individual trimmer power stats. All are controlled by a main power stat which also controls a reciprocating wire distributor with adjustable stroke length for laying uniform layers of wire on the spools.

Individual torque motor rewinds with micro-adjustment power stats. A simple arrangement of the rewind spools on the console allows easier spool changes even at the high speeds in which the unit operates.

Below: Precision-grooved sheaves with graduated depths of machined aluminum have free-turning nylon bearings.



**MICHIGAN OVEN COMPANY**

425 Brainard • Detroit 1, Michigan

MOCO

Please send complete information on the new Type "B" MOCO Wire Enameling Machine.

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

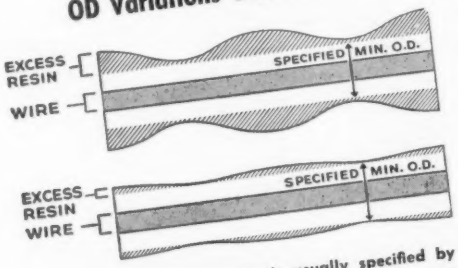
CITY_____ ZONE____ STATE_____

# U.S.I. POLYETHYLENE PROCESSING TIPS

## Choose the Right Resin For Polyethylene Wire Coating

Now that polyethylene is being widely accepted as an insulating material for wire and cable, insulated wire manufacturers and plastics producers are working closely together to provide the best insulations at the lowest possible cost. Although the only true test of a given polyethylene resin is a test run followed by a thorough evaluation of the finished wire, there are certain principles that can be used beforehand as guides. For example:

## OD Variations Cost Money




**Minimum Outside Diameter is usually specified by the wire customer. But a variation in OD above this minimum uses extra quantities of polyethylene resin — and cuts into extruder profits. These variations can be reduced by using resins with consistant flow characteristics as shown in the lower sketch.**

## Higher Production Rate Means Higher Profit

The faster a machine can be operated, the more money it can make. But higher rates require tighter controls — especially tighter control of resin properties. A resin variation that might still give a satisfactory product at moderate production rates may not be acceptable when the extruding rate is pushed to its limit. Again, consistency of resin properties is of extreme importance.

## Final Properties Are All-Important

Deformation under load, stress-cracking, low-temperature brittleness and spark failure must be kept to a minimum in an acceptable wire and cable insulation. Any resin used, no matter what its processing characteristics, must pass these tests.

## Why We Recommend PETROTHENE®

Because we make it — of course. But more than that, PETROTHENE does a good job for wire and cable extruders because our manufacturing process does achieve the high consistency processors are looking for. Shipment-to-shipment, bag-to-bag, and cube-to-cube, variations are held to a minimum. This high consistency enables insulated wire manufacturers to operate at highest rates with minimum OD variation when using PETROTHENE electrical grade polyethylene resins.

PETROTHENE resin properties also measure up to end-use standards for deformation under load, stress-crack resistance, low-temperature brittleness and spark failure.

## Three Basic Resins Are Available

PETROTHENE 300, M.I. = 0.3; PETROTHENE 301, M.I. = 1.0; PETROTHENE 302, M.I. = 2.8. Each available with carbon black, color, JZF antioxidant, and/or non-discoloring antioxidant, compounded to your specifications.

## U.S.I. Services

Literature and samples of PETROTHENE electrical grade polyethylene resins are available at your request. U.S.I. Technical Service representatives are also ready to help you with individual processing problems.

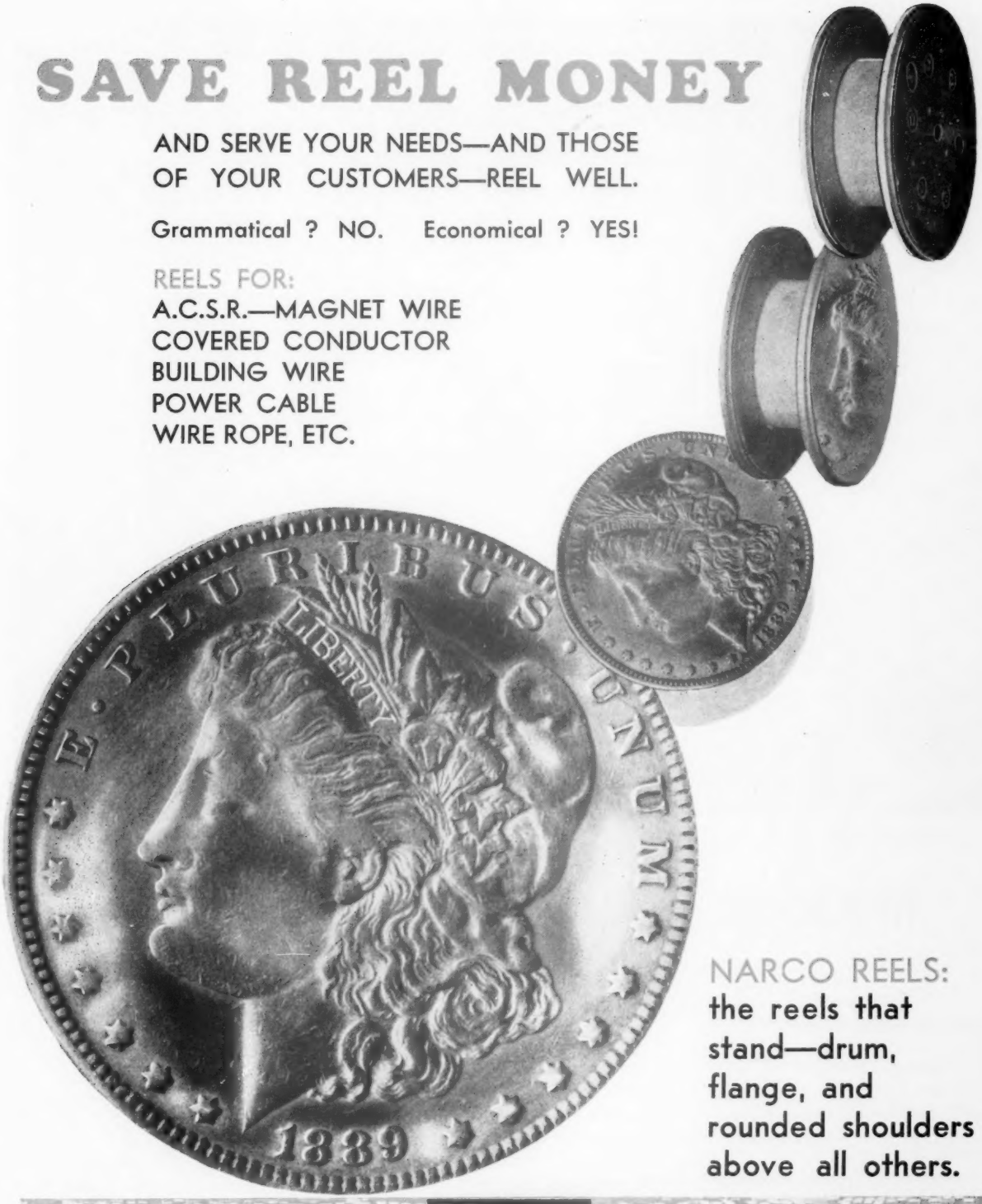
**U.S.I. INDUSTRIAL CHEMICALS CO.**
Division of National Distillers Products Corporation
**99 Park Avenue, New York 16, N. Y.**
***Branches in principal cities***

# SAVE REEL MONEY

AND SERVE YOUR NEEDS—AND THOSE OF YOUR CUSTOMERS—REEL WELL.

Grammatical ? NO. Economical ? YES!

REELS FOR:
A.C.S.R.—MAGNET WIRE
COVERED CONDUCTOR
BUILDING WIRE
POWER CABLE
WIRE ROPE, ETC.




NARCO REELS:
the reels that stand—drum, flange, and rounded shoulders above all others.

NORTH ANSON REEL CO.
NORTH ANSON, MAINE

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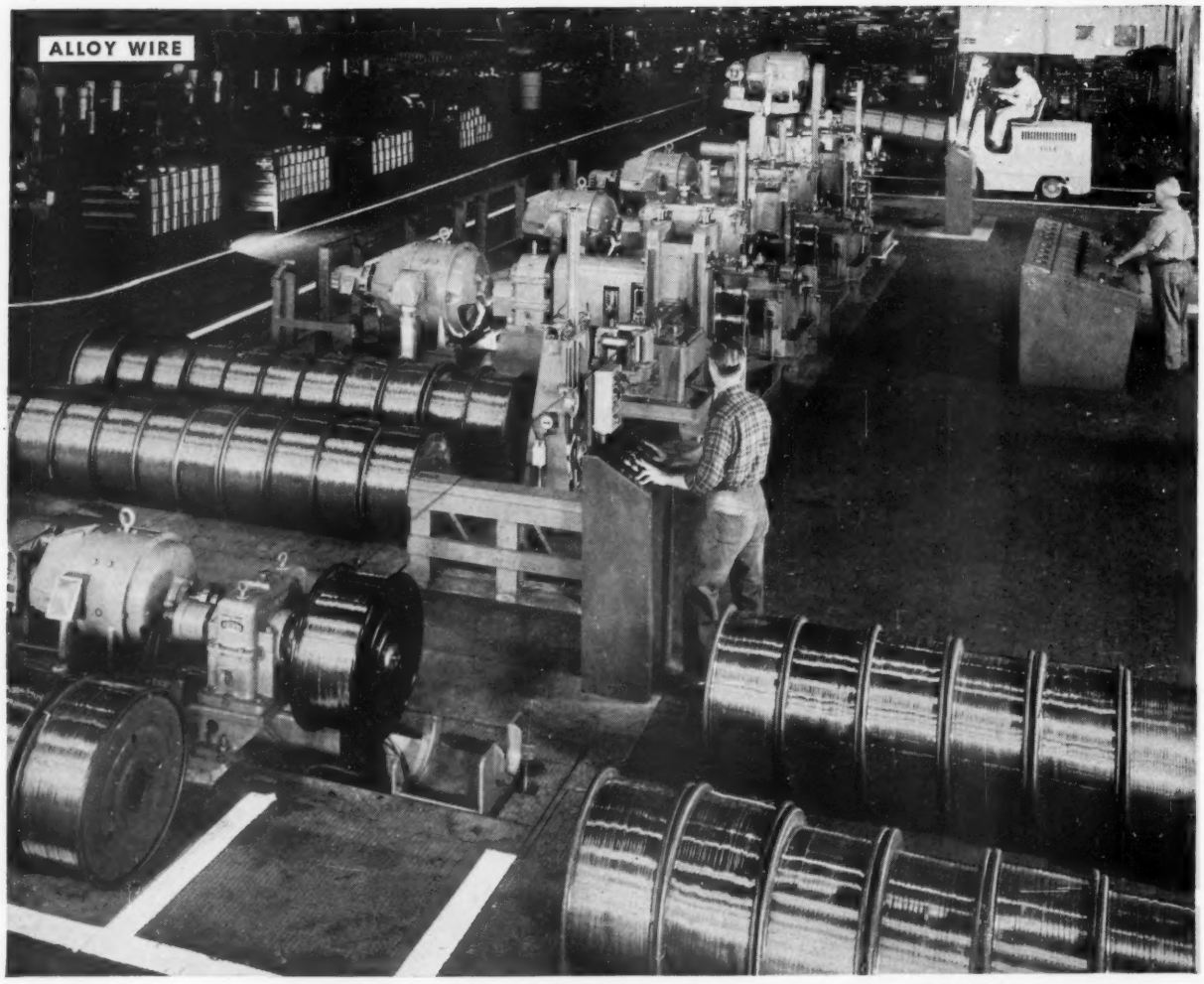


**NEW 3-STAND** High Speed Tandem Flat Wire Rolling Mill at Ansonia, Conn., operates at speeds up to 2000 feet per minute.

# New equipment, new methods increase range and quality of Anaconda Wire

Now you have a wider selection of Anaconda Wire to choose from than ever before.

Anaconda Wire is fabricated to satisfy a very wide range of requirements, both manufacturing and functional. A wire usually can be adapted to precise tooling and production rate requirements and also possess the necessary properties for its end use function.

Anaconda Wire is produced for thousands of different applications. Copper and more than 100 different copper alloys are processed into wire in an almost unlimited variety of sizes and shapes, tempers and finishes.

In addition to Yellow Brass, Red Brass and Commercial Bronze, we produce Everdur*, Phosphor Bronze, Nickel Silver and Cupro Nickel. We also make Leaded Yellow Brass and Leaded Red Brass for special applications where heading and machining properties are desired.

New equipment enables us to produce a wide range of inside diameters of coils (wound either clockwise or counterclockwise) in coil weights up to 400 lb. – spools and reels of wire from 2-lb. up to 1000-lb. capacity – stranded material in various weights up to 2000 lb.

Quality? It's at an all-time high. Casting procedures have advanced. And new rolling and drawing equipment enables us to produce wire of superior grain structure. Every foot of Anaconda Wire is sound and uniform. Working characteristics are excellent.

Our Technical Department will cooperate in helping you find the combination to that "one best wire." The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

*Reg. U. S. Pat. Off. 5481

ANACONDA®

**Copper and Copper Alloy Wire**

# Your **DIES** last longer, too, with **DURPONS®**

We've stressed so often the fact that in wet drawing non-ferrous metals, Nopco Durpon Drawing Compounds last twice as long, and cost no more . . . you may have overlooked the fact that Durpons mean much longer life for your dies. Both factors contribute to plant economies.

**LONG BATH LIFE** is achieved chemically by the addition of stabilizers that neutralize carry-over acids.

**CLEAN SYSTEMS** are a result of the stability of the emulsion.

**LONGER DIE LIFE** can be attributed to no sacrifice in quality fat content, and chemically active agents that prevent the formation of hard, insoluble copper and lime soaps that tend to score dies.

Try these money-saving compounds and see for yourself. Mail the coupon today.

**DURPON L**—*for rod, heavy and intermediate wire*
**DURPON FW**—*for fine wire*

NOPCO

PLANTS: Harrison, N. J. • Cedartown, Ga. • Richmond, Calif.

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390 Sandor Street, Harrison, N. J.
Gentlemen:
Please send me a copy of your technical bulletin and a free trial sample of: DURPON L ☐ DURPON FW ☐

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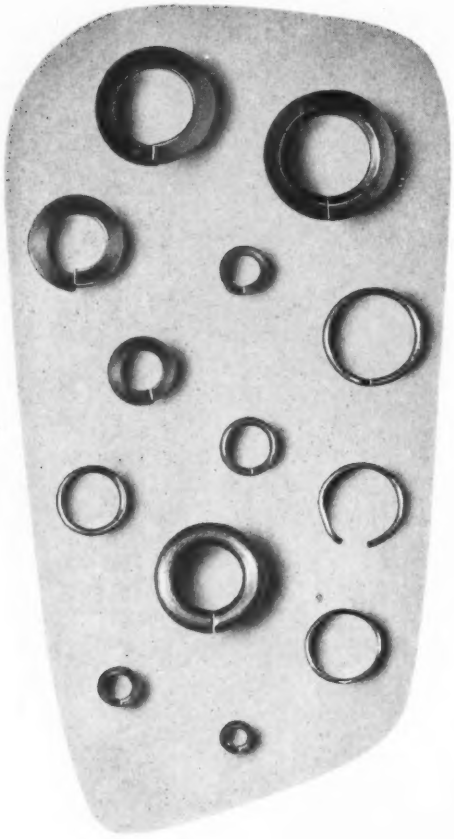
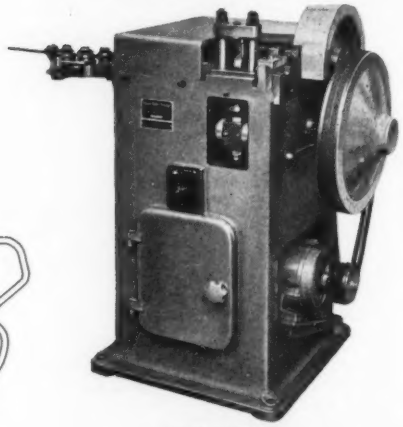


## ECONOMICAL PRODUCTION
## DEPENDABILITY
## UNIVERSAL APPLICATION

- High Output
- Simple Operation
- Low Maintenance Costs
- Easily adjustable
- Large Range of Capacity
- Simple Tooling
- Semi-skilled Personnel

**AUTOMATIC MACHINE (Model FR 25) for making RINGS from *flat steel* (max. 4,5 x 3 mm = .18" x .118") and *round wire* (max. 4,5 mm = .18" dia.) such as:**

**LOCK WASHERS**
**CALIBRATED RINGS (tolerance: ± 0.03)**
**CALIBRATED WASHERS for press studs**
**BUTTON RINGS, RETAINER RINGS**
**PLANE OR UNDULATED RINGS**
**(special shapes up to 25 mm = 1" outside diameter)**



**OUTPUT**
**250-400 pieces per minute**

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# MEYER, ROTH & PASTOR

**Machines for the mass-production of articles from wire and ribbon metal • Automatic Chain Making Machines • Wire Straightening and Cutting Machines**

# THE BEELINE WIRE DRAWING MACHINE

**Straight-line type Wire Drawing Machine for high production of all wire grades**

This picture shows a Beeline DG 4, built for an inlet wire diameter of about 7 mm (approx. .276 inch). High carbon steel.

Prominent Beeline features:

- Complete absence of slipping between wire and block.
- Direct block-to-block wire running, with automatic speed control and no loops or other mechanical adjusting devices.
- Continuous speed adjustment from almost zero up to maximum.

Let us help you solve your problems. We shall be glad to answer your questions promptly. Don't forget to let us know what wire is to be drawn, the inlet and finished diameter, its intended use, the production required, and all other relevant information (tensile strength of the finished wire etc.). Then we can suggest a machine that is just right for you.

**The machine is at present manufactured in three different sizes:**

**BEELINE DG 5**

for heavy wire, about 13 mm. (.500 inch)

**BEELINE DG 4**

for wire rods, about 7 mm. (.276 inch)

**BEELINE DM 3**

for wire with an inlet diawire of about 3 mm. (.116 inch)

**MORGÅRDSHAMMAR**

MORGÅRDSHAMMARS MEK. VERKSTADS AB • MORGÅRDSHAMMAR • SWEDEN

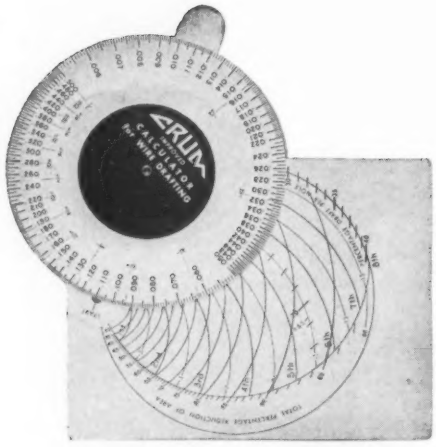
**Cables: Morgårdshammar, Ludvika. Tele: 0240–71100**

## *SAVE SET-UP TIME WITH THE . . .*

# CRUM CALCULATOR

## FOR WIRE DRAFTING

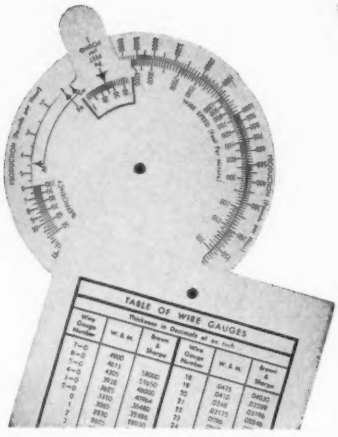
### *Useful and Accurate!*




Front view of Crum Calculator.

**THIS NEW DOUBLE-PURPOSE CALCULATOR WILL:**

1. Provide quicker and more accurate information on die sizes and reduction areas;
2. Calculate wire production rates for various speeds and efficiencies.




Reverse view of Crum Calculator.

### SOME OTHER FEATURES OF THE CALCULATOR

- Has new scale for more accurate determination of small percentages.
- Gives readings in B & S gauges.
- Intermediate lines provide reductions for 16 holes in one setting.
- New rectangular shaped back for better protection of calculator.
- More legible % draft-per-hole scale.
- Vinyl plastic construction, resistant to wear, warping, dirt, perspiration, wire drawing soaps—can be cleaned.
- Still fits your vest pocket.
- Handy tables of W & M and B & S gauges.
- Feet per pound calculating scale for steel, copper and aluminum wires.
- Durable, accurate, easy to use.

**The improved Crum Calculator is worth its weight in gold in time saving —no laborious mathematical calculations necessary when you use it. Instruction sheet with examples accompany each Calculator. You should have one or more in your wire drawing department.**

**THE PRICE: $5.00 EACH**

***Send your orders to:***

# WIRE AND WIRE PRODUCTS

**453 MAIN STREET** **STAMFORD, CONN.**

***(Exclusive distributors)***

KEYSTONE XL WIRE STUDY

# 7 2/10 diameters...only 2 blows

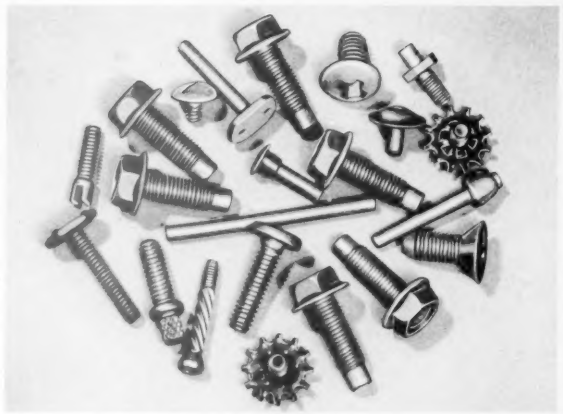
## KEYSTONE WIRE gives uniform quality products at Midland Screw Corporation

### *flowability* IS THE SECRET

Midland Screw Corporation, Chicago, Ill., threw the rule book out the window when they cold headed, in 2 blows, the welding screw shown here. That's the way this progressive firm tackles many problems. They've learned that they can make the difficult—or well-nigh impossible—jobs, easy when they use Keystone "XL" Cold Heading Wire.

It will pay you to investigate the possibility of using Keystone "XL" Cold Heading Wire in designs that have been considered too complex for ordinary wire. Talk over your problems with your Keystone Wire Specialist. He will show you how the *flowability* characteristics of Keystone "XL" Wire can help you, too!

*Keystone Steel & Wire Company, Peoria 7, Illinois*



*Here are a few of Midland's products. Note that this includes the hex head Spin Lock bolt which has been produced for 3 years for the automotive industry from Keystone Wire without a single reject.*

**KEYSTONE STEEL & WIRE COMPANY**
**Peoria 7, Illinois**

Mail coupon for free booklet—
*COLD HEADING FACTS!* Discusses methods, technical facts, wire requirements and other data.

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Company_____

Street_____

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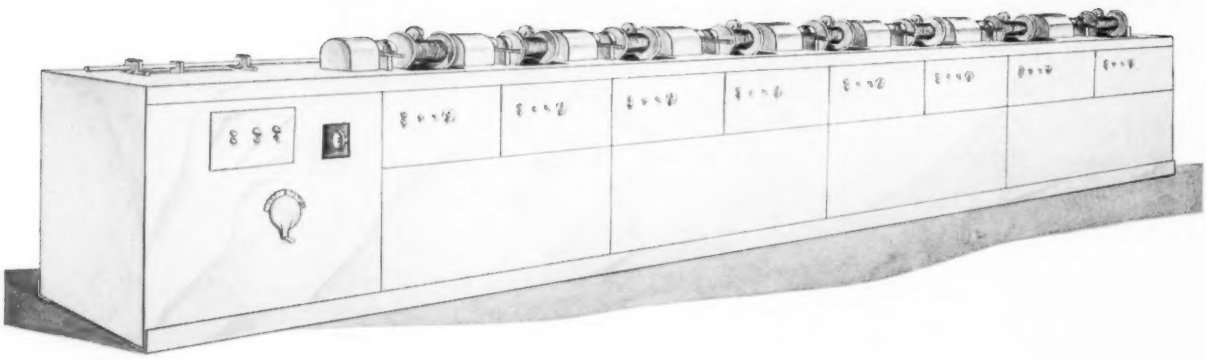
**KEYSTONE**
WIRE FOR INDUSTRY

# THE LAST WORD in MODERN, EFFICIENT DESIGN!



## MULTI-HEAD RE-SPOOLER, Class A

The clean, uncluttered lines of the new JLE Multi-Head Re-Spooler mean far more than just good design.

First . . . total enclosure guards vital parts against dust and damage, reducing maintenance to a minimum . . . protects workers against injuries as well.

Second . . . all operational parts are located in-line at convenient bench height, below eye level and in a single line of vision, thus reducing operator fatigue.

Third . . . simple push-button and toggle-switch controls are uniformly arranged at hand level, promoting efficiency and speed of operation.

These superior, functional design features, together with precision engineering employing the finest available components, make the JLE Multi-Head Re-Spooler the leader in the field today.

***Write, phone or cable for complete details.***

**FEATURES and SPECIFICATIONS:**

- Available with 4 to 10 Spindles.
- Capacity .010 to .080 diameter wire.
- Winding speeds up to 1,000 fpm.
- Ball-Bearing – Worm Traverse, adjustable over 9 to 1 range in wire diameters.
- Maximum spool size, 8" flange diameter, 6" traverse.
- Main Motor Drive, drip-proof, ball bearing, 1½ HP, 220/440 Volt 3-phase, 60 cycle, variable through 7 to 1 ratio.
- Anti-Friction Ball Bearings on all shafts.
- Payoff equipment furnished to customer's specifications.

**EACH INDIVIDUAL WINDING HEAD EQUIPPED AS FOLLOWS:**

- Ball Bearing Mountings.
- Magnetic Brakes.
- Magnetic Clutch with Torque Control.
- Lever-Operated Reel Release Clutch.
- Automatic Full-Reel Cut-off.
- Built-in Tension Control independent of payoff.

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**James L. Entwistle Co.**

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Amazing how many different products are made from Chase copper alloy wire! Everything from strainer cloth to cold-formed nuts. Yet, no matter *what* the final product, or *how* it is made, Chase wire makes it *better!*

You don't get *ordinary* copper alloy wire from your nearby Chase warehouse. For Chase copper alloy wire is the cleanest, best-tempered, easiest-to-work wire you ever used.

First of all, we take pains to give you the ideal alloy for your specific needs. We test and re-test to make sure every shipment comes up to our strict quality standards.

Finally, we deliver Chase wire to you perfectly "cast," so it uncoils uniformly, without twisting or tangling.

Speaking of delivery, you can always expect super-prompt service from Chase. Streamlined order handling is standard Chase procedure—whether you order one small coil or a hundred.

Contact your nearby Chase warehouse. Try Chase copper alloy wire. Try Chase service. You'll like both.

CHASE NOW SELLS
STAINLESS STEEL, TOO!

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Headquarters of the Metallurgical Products Department of General Electric Company, 1117 E. 8 Mile Blvd., Detroit 32, Michigan. Carboloy Cemented Oxide and carbides are made here. G-E permanent magnets and specialty resistors are manufactured in the Edmore, Mich., plant.

# INDUSTRY CAN EXPECT FROM
# AELECTRIC'S
# CAPRODUCTS DEPARTMENT

**The new G-E Metallurgical Products Department is the successor to the Carboloy Department. Here's what this change will mean for you.**

Since 1928, the General Electric trademark "Carboloy" has been identified with a brand of cemented carbide. But today, Carboloy® cemented carbides are just one of a broad range of products which bear the famous Carboloy trademark.

Cemented Oxide, the Machinability Computer, toolholders, diamond dressers, drawing and forming dies . . . these are on the market today. Tomorrow, you will see many other new-product developments for the Metalworking Industry.

With carbides like the new Extra-Performance Series 300 steel-cutting grades, these products are being made available to you through a distribution team which is unmatched in the carbide industry from the standpoint of inventory, delivery, and service.

In addition, the Metallurgical Products Department makes other products which carry only the General Electric trademark: permanent magnets, vacuum-melted alloys, hevimet, thermistors, and Thyrite® varistors. And on the industrial horizon are G-E man-made diamonds.

Thus, the new departmental name symbolizes the broadened scope of this Department's activities. Equally important, it indicates how vitally interested General Electric is in the Metalworking Industry.

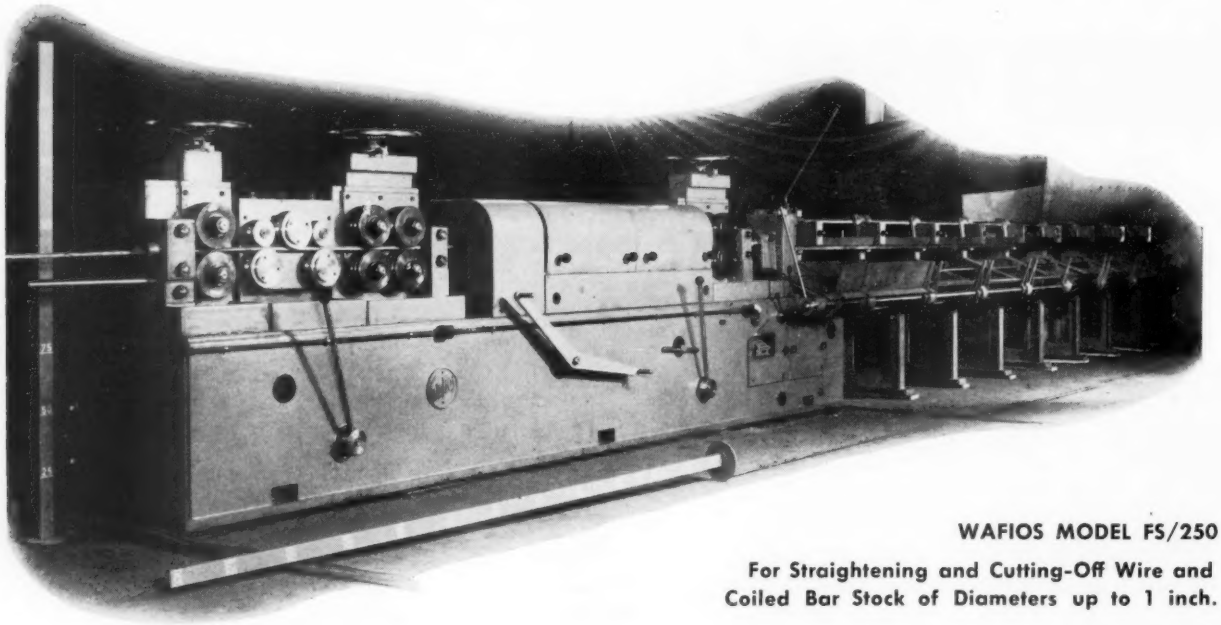
Many of the products listed above are the result of fundamental investigations carried out at the G-E Research Laboratory in Schenectady. Many new developments in machining, forming, and drawing techniques are the work of G-E Engineers. And, when new products and methods are developed for the Metalworking Industry by General Electric, they, too, will come to you from the Metallurgical Products Department.

*Progress Is Our Most Important Product*

GENERAL ELECTRIC

# WAFIOS

## STRAIGHTENING AND CUT-OFF MACHINES



**WAFIOS MODEL FS/250**

For Straightening and Cutting-Off Wire and Coiled Bar Stock of Diameters up to 1 inch.

**Based on more than 63 years of experience in the building of Straightening and Cutting Machines, WAFIOS is proud to offer this heavy duty Model FS/250.**

**WAFIOS Straightening and Cutting Machines are precision built to exacting standards for the production of the highest quality straightened and cut wires in diameters from .016" up to 1.000", in lengths up to 40 feet.**

**WAFIOS also builds Straightening and Cutting Machines for Profiled Wires, Electrodes and Hot Rolled Products, with either stationary or "Flying Shear" Cut-Off.**

KO CO., INC.
INDUSTRIAL IMPORTERS

Sole distributor for the U.S.A.:

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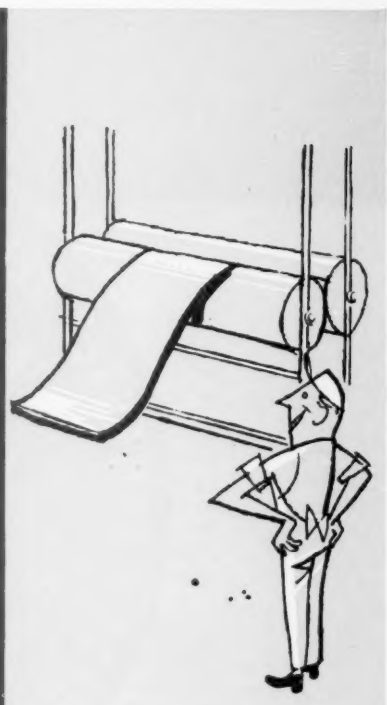
Reutlingen 3, Germany

# NAUGATUCK NAUGAPOL POLYMERS

**SPECIALLY-PROCESSED BUTADIENE-STYRENE COPOLYMERS**

**Naugatuck uses only acid as a coagulant rather than salts which tend to remain and absorb moisture in the rubber.**

**While still wet, the coagulated polymer is strained to squeeze out all the acid serum.**



**After drying, the polymer is again strained and milled to insure cleanliness and uniformity. Milling also aids subsequent processing.**

## Specially Processed for Low Moisture Absorption

MADE to be *different!* That's the story of Naugatuck's premium grades of GR-S rubber known now as NAUGAPOLS. Naugatuck's *special processing* during transformation from the liquid copolymer state produces elastomers especially suitable for use in *wire and cable insulation, and mechanical rubber products requiring good flexibility at sub-freezing temperatures.*

A stabilizer or antioxidant is added to each NAUGAPOL® prior to flocculation to protect it against oxygen deterioration and heat degradation.

Contact your nearest Naugatuck representative regarding these premium-grade GR-S elastomers.

Naugatuck Chemical

**Division of United States Rubber Company**
**Naugatuck, Connecticut**

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# For the FINEST Dies...

*Specify*

## There Are Many Reasons Why V-R Leads The Field!

V-R NEW Cylindrical nib and improved method of assembly insure high degree of concentricity.

V-R . . . First in producing the only Tantalum-Tungsten carbide developed specifically for Drawing Dies.

V-R . . . First to manufacture Carbide Dies with preformed rough cored back relief.

V-R . . . First to furnish Carbide Dies rough cored to finish at hole sizes below .010".

WRITE TODAY for NEW Vascoloy-Ramet Die Catalog VR-461.

The New V-R Die Catalog gives complete ordering information on all V-R Dies for drawing wire, rod, bar and tube.

Vascoloy-Ramet CORPORATION

820 MARKET STREET

WAUKEGAN, ILLINOIS

# The Wire Outlook

There seems to be every assurance now that the momentum of business will make the first half of 1957 good and it probably will carry on through the entire year. 1955 showed a "gross national product" of 390 billions; for 1956 it was 410 billions; for 1957, with some small fluctuations here and there, the gross national product figure is expected to exceed 1956 by a comfortable margin.

Taking a long-range view, the economy should experience a great upsurge over the next 20 years and it has been estimated that total business volume approximately will have doubled in terms of 1956 prices. The steel industry, looking ahead, has plans that will increase capacity by 50%, or 70 million tons, over the next 15 years.

These assumptions are based on the expectation that there will be no major war, yet no permanent peace. What this would mean to the industrialist, however, is that there must be continued and constant expansion of production facilities to keep pace with the growing population and its increasing desire to have more of the appurtenances of good living.

In 1956 the baby crop was bigger than ever—about 4,200,000 of them. In 20 years there probably will be 36% more people in the country to buy homes, goods and services. More people will be seeking good educations. Incomes and wages will rise and a shorter work-week is almost inevitable, which will be conducive to greater spending.

The fly in the ointment is the ever-growing spiral caused by wage demands and consequent higher prices. This is a vicious circle of cause and effect, the end of which may not be in sight for years to come, as long as labor leadership policy is to keep on with demands. Even now the unions are angling for increases that will lead to the upping of prices for steel and everything else in 1957. This pressure is being felt not only here, but is beginning to build up in Europe. The Suez closing, with its effect on oil and shipbuilding, has contributed to the inflationary trend.

Automobile sales look promising for the year. The trend, if continued, will result in a lot of orders for the many kinds of wire used in car construction. Besides the great wave of road building there is renewed interest in many large cities for slum clearance. Residential building may decline, but it is estimated that $12.7 billions will be spent for new homes during the year. School, hospital, utility, business and industrial building is on the rise. Great quantities of steel and insulated wire will be consumed by these projects.

Tax reductions, as most now know, unfortunately are not being considered this year because of the cold and near war conditions and the renewed plans for foreign aid to free countries. Defense spending alone will rise 2 billion dollars to 38 billions. A major portion of this increase will go into aircraft and guided missile programs.

Manufacturers' wire users are getting their inventories on a better basis and some buying has been cut back. Very few wire types are not readily available. This is an off-season for merchant wire products, but the demand traditionally starts to show its seasonal pick-up in February.

Sales of wire rod are reported to be holding up and the demand for stainless wire is good. Wire for welding rods is moving well. Automotive wire is considerably better than it has been and rope wire has shown some improvement. Producers of fasteners, furniture and bedding are active buyers of wire.

We are living in exciting, momentous and challenging times. The opportunities of the future will be limited only by our abilities to visualize and capitalize upon them. While we always hope for more settled conditions throughout the world, we should be grateful that some progress is being made, even if it is so slow that at any particular time it is difficult to recognize it.

Edmund Duval Sickels

EDITOR

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# superior wire drawing lubricants

STEELSKIN **WIRE DRAWING GREASES** for various finishes for coat-hanger wire, welding wire and extra-clean, extra-bright wire.

STEELSKIN **COLD EXTRUSION WIRE DRAWING POWDERS** for all types of cold-heading finishes including single and double extrusion.

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STEELSKIN **DEEP DRAWING COMPOUNDS** for stamping, and deep drawing of all metals.

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REDSKIN — for uniform copper coating for steel wire, be sure to specify "REDSKIN" COATING COMPOUND.

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WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip.
DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 32 January, 1957 No. 1

# Fulfillment of a Trust

by Kenneth H. Davis, President
The K. H. Davis Wire and Cable Corporation
Los Angeles, California

## THE MORDICA MEMORIAL LECTURE FOR 1956

Mr. President, Fellow Members of The Wire Association and Guests:

**Today** it is my privilege to relate to you a trust placed in me by **Jack Mordica** on a cold blustery day in February some 23 years ago. This trust in the form of advice and wisdom imparted to me by Jack had a large influence on my future and any success that I have obtained as the head of a small non-integrated wire mill.

★ ★ ★

**To** prologue you on the events that lead up to this meeting with Jack Mordica I can say that I was given the questionable opportunity in 1932 to acquire a controlling interest in a small wire mill located in South San Francisco which did business under the name of Specialty Wire Co. Inc. What I really could acquire was an interest in three acres of land, two wood frame corrugated iron structures, well supported by mortgages, some 200 tons of reject rope and tirebead wire and various and sundry equipment This equipment consisted for the most part of single hole drawing benches, a double lead patenting furnace with a burned out hot pan, and a small tinning frame. In addition to these dubious assets I also had the privilege of receiving the largest amount of accounts payable one person could hope NOT to have. In fact, the accounts payable far exceeded by any stretch of the imagination the value of the equipment, plus inventory, if the inventory had been of prime saleable material.

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**To** acquire controlling interest in this venture, all I had to do was to convince the creditors of raw materials and supplies not to take legal action of attachment and thus stymie the reopening of business, and also to show the bankers how I planned to reimburse them for the money that they had loaned to this company. It was not an easy task, for the assets of this company were of questionable value and my own personal finances were definitely limited. Probably at no time in the last 100 years of American History was the time more opportune to do something with nothing. America was in the depths of the depression following the 1929 crash and business ventures were falling like straws in a tornado, and at that time a common

Kenneth Howe Davis

**Each year the Association's Board of Past Presidents is charged with the pleasant duty of selecting a man to deliver the Mordica Memorial Lecture at the Annual Convention to honor and memorialize the memory of John Mordica, the Association's first president. The person to whom the invitation is extended is one who has achieved recognition in the industry for outstanding contributions to its advancement and the invitation is the highest honor within the power of the Board of Directors to bestow upon a member of The Wire Association.**

**Kenneth Howe Davis was selected for this honor in 1956. He passed away suddenly on July 10, 1956, after having prepared the lecture. His complete biography was published in the August, 1956, issue of Wire and Wire Products.**

**His son, Robert H. Davis, who has succeeded him as President of the company, most ably and creditably delivered the lecture in his father's stead.**

# IN MEMORIAM

**JOHN MORDICA**
**1873-1937**

return to creditors from a defunct business would be from five to ten cents on the dollar.

★ ★ ★

I felt like a small boy starting out to slay a dragon with a sling shot with nothing but time to lose and all to gain. I convinced all the creditors to set aside their rights of legal attachment for a period of two years for which I guaranteed to liquidate their obligations at 100 cents on the dollar. It took convincing arguments with some of the larger creditors, but in the course of a month I was able to unanimously sell the deal. With my pockets full of signatures from creditors, I walked into the bank president's office knowing that I had a second dragon to get into the bead of my sling shot—so I tried a new pitch. I would form a new corporation to take over the assets and assume the liabilities of the defunct corporation, for which I would receive the controlling common stock interest of the new corporation. I, in turn, would give the bank 6% cumulative preferred stock in cancellation of their loan. Well, it worked, and the **Standard Wire Corp.** of South San Francisco was formed.

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I didn't do this without help. I was ably assisted by one of your current directors, **Earl R. Potter**, who is now president of the **Industrial Wire Products Corporation** of Los Angeles. Earl had worked in many capacities for the **Specialty Wire Company**. He knew the equipment thoroughly, particularly he knew all the mistakes that created the terrific tonnage of rejects stacked in and around the mill. **Earl Potter** took over the opening of the new venture as a one-man wire mill. He was superintendent, cleaner, die maker, patenting furnace operator and wire drawer. It was our collective job to revamp and modernize our equipment to produce the products that could be sold at that time in our area of operation.

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**To** obtain working capital to start this venture, Earl and I bailed out the tin pot and sold the tin in ingot form. This provided us with the necessary cash to meet our immediate obligations. Earl and I, after much discussion, realized the downward path of the old mill was due to lack of progress and diversity; and while Earl worked to convert the rejects into saleable merchandise I scouted the immediate market for new products we might make and sell. Each day I would bring in a new idea and we would analyze the process and equipment needed to produce this item. Such discussions often went far into the night. These late hours were perfect early training for future attendance at the Wire Conventions.

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**Finally** in utter confusion and in hope of solidifying our thinking, we decided to visit the rest of the wire industry and see what they were doing and how they were doing it. **The Wire Association** was new at that period, but the organizers had sown well the seeds of the open door policy. In the winter of 1932 Earl and I started across the country, much like the bear who went over the mountain to see what was on the other side. We traveled between California and Massachusetts via Greyhound Bus, and in the course of our travels we visited some twenty wire mills across the country. We carried a train time schedule as well as a bus schedule in our pockets so that we could let the executives of the Eastern wire mills take us to the train and thus we would seem like prominent businessmen from the West. We'd go into the station by the front door, walk through the station, and leave via the back. We'd quickly catch a cab to the bus station and be on our way to the next town.

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**The** wire mills and processes we observed on this trip were very interesting and informative, but the highlight of the whole trip was spending a full day with **Jack Mordica** at Sparrow's Point. We frankly told Jack our problems, what equipment we had and what our ambitions were. Jack was a real good listener, and after we had spoken our piece and he had quizzed us on our background and ambitions he let go with his advice. He prefaced his remarks by stating that once HE was interested with others in a small non-integrated specialty mill. But the venture had failed. In retrospect he knew the pitfalls as well as what would have made it successful. I remember well his seven recommendations for the success of a non-integrated specialty wire business and have faithfully attempted to follow his recommendations, which involved seven points.

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**No. 1.** Geographic Location. He emphasized the basic need of locating in a growth area with sufficient supporting back country to sustain a uniform purchase of durable goods. This, he said, would bring to the area all of the purchasers of wire and wire products of a specialty nature. This prompted the sale of **Standard Wire Corporation** in 1934 to a subsidiary of **Colorado Fuel and Iron** and the establishment of the present **K. H Davis Wire & Cable Corporation** at Los Angeles. In 1934 when this sale was consummated Los Angeles was a relatively virgin territory, there being no wire mills closer to Southern California than San Francisco.

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**Point** No. 2 dealt with the type of product manufactured. Jack Mordica's advice was to stay clear of the base tonnages such as nails, barbed wire and field fence. These products, he stated, were the relatives of the integrated mills and were as important to them as their life blood. We have followed that advice and not tried to buck the tiger in that direction.

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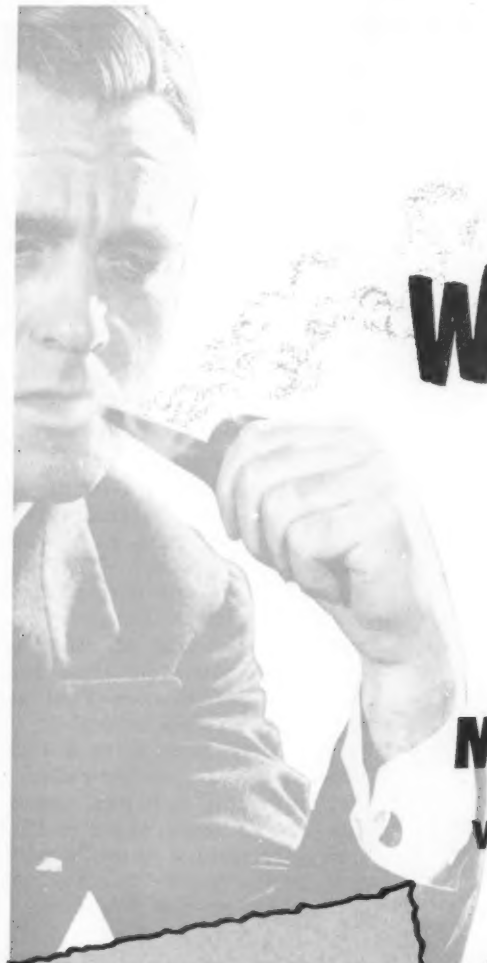
**The** third point of advice was to approach with fervor the less than carload business making quality and service a paramount sales issue, and to make delivery, if at all possible, in the length of time that would be required by major mills to process the paper work. It has been the byword of our operation to accommodate a LCL customer. I remember Jack Mordica's words—"You must operate on a large percentage of LCL business and collect the LCL premiums for doing so. Remember when you as a small company go to your

(*Please turn to page* 92)



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# Proceedings of the Annual Convention of The Wire Association

October 29 — November 1, 1956

Pittsburgh, Pennsylvania

**These proceedings are a digest of the recorded discussions following the delivery of papers at the technical sessions. For some papers these will be missing, as in instances where there were no discussions and for one session, where the tape recorder failed to function. The transcripts, in addition were so badly garbled that in many instances it was difficult to determine what actually had been said in the questions and answers. Our apologies to the speakers if they find errors of omission or otherwise.**

## DISCUSSIONS

### Joint Technical Session, Ferrous and Non-Ferrous Divisions

October 29, 1956

### CHAIRMAN OF MEETING

Frederick H. Parkin, Parkin Chemical Company, Pittsburgh, Pa.

PAPER: "Draw-Pak"
by Joseph J. Kovaleski,
Sales and Application Mgr.
Coulter and McKenzie Machine Co.,
Bridgeport, Conn.

**In** reply to a question on how to inspect wire after it has been processed and is on a spool, it was explained that this could be done only on the top layer, which, if found imperfect, could be removed. Were the accumulator an adaptor, instead of a drum, there would be an exposed coil similar to one on a block.

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**Regarding** lubrication on the wire, this facilitates nesting in the drum and makes possible a heavier load, but is not necessary, as a dry wire will package satisfactorily.

PAPER: "Hot Dip Wire Aluminizing Processes and Alloys"
by John D. Sprowl,
Physical Metallurgical Branch
Kaiser Aluminum & Chemical Corp.,
Spokane, Wash.

**Relative** to comparative corrosion resistance between aluminum and galvanized coating on ACSR wire, the speaker said that tests conducted at their test site at Corpus Christi, Texas, over the past two years on mechanized C, aluminized, hot-dip coatings, greases, etc., the first two were comparable and the galvanized coating showed an appreciable attack in the salt atmosphere. This was all on re-drawn stock, which was .083", with an .0007" aluminized coating, whereas the mechanized Class C wire had 1.8 oz. per square foot. The wire had a 204,000 tensile, stress relieved in lead, with a 4½% elongation. The exact difference between aluminized and galvanized wire is not known, because while the latter has begun to deteriorate, the former has shown no signs of failure in two years. In sulphurous and industrial atmospheres the galvanizing fails quickly and aluminizing holds up well. In rural atmospheres, such as in the plains states, one appears to do as well as the other. The coating is an aluminum-silicon alloy.

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A question on the total reduction possible drew the response that 84% reduction of aluminized wire had been successful, but the hard interfacial layer should be thin, as it tended to crack and scatter between the aluminum and steel during drawing and might protrude through the coating. Proper lubricants and other precautions will help to avoid this. Aluminized wire will take a one diameter wrap usually, but the galvanized will do better. Failure, when it occurs, is on the compression side of the wrap, but is often just a wrinkle that does not destroy the coating. This is on 28 or 38 wire. The interfacial layer offers some protection to the steel's corrosion as against a plain steel surface, tests in a sulphur chamber have shown.

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**Regarding** cooling procedures, Kaiser uses an air blast, although the method depends on the process. High carbon in a bath temperature above the critical should not be cooled too rapidly or it will harden the wire. Mr. Sprowl stated that they had found no way to anodize the coating. Low alloy steels with 1 to 9 chrome, offers no difficulty, nor does plain carbon or stainless steel. On the 4340 type of steel, given the same bath time and temperature, the interfacial layer tends to be thin. While batch galvanizing can be done readily, aluminizing cannot be done this way.

## DISCUSSIONS
## FERROUS DIVISION TECHNICAL SESSIONS
### October 30, 1956

CHAIRMAN OF MEETING
Sterling Edwards, Pres.,
E. H. Edwards Co.,
So. San Francisco, Cal.

PAPER: "Heat Treating of High Carbon Steel"
by N. D. Montgomery,
Pittsburgh Steel Co., Monessen, Pa.

**The** speaker stated that inspection started at the mill with steel, followed through the bar mill and finally to the rod before the heat treating operation, where ends of coils are given a surface examination and a sample subjected to a reverse twist test, which is a good one. Defects that they run into are removed either by chipping or by controlled type sparking. Chipping is best for high carbon, while sparking has been found better for low carbon.

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**Two** furnaces are used, one for .163" to ½" or ⅝" wire and the other for .062" to .162", both similar in construction, but different in size. Point controls are used on the atmosphere of the annealing furnaces. The dew point, Mr. Montgomery said, ranged from minus 40 to minus 60, with an average of minus 50 aimed at. The atmosphere is CO of 6% with no O or $CO^2$.

PAPER: "Electromatic Oil Tempered Wire"
by George A. Sweitzer,
Metallurgical Investigator
Jones & Laughlin Steel Corp.,
Aliquippa, Pa.

A question regarding the arcing in the troughs, elicited the information that this had been overcome by insulating the sinkers to eliminate electrical contact and by making sure that there were no crossed wires, as otherwise holes would be burned in the wire surface. One person commented on the time lag in heating between the outside and inside of the wire, said to be nil in this process, remarking that in their lead heating the time lag is so slight that it occasions no concern. Mr. Sweitzer's paper referred to a slight loss of temperature on the way to the quenching medium. A question as to whether this was damaging resulted negatively. The speaker said they secured a maximum temperature just before entering the quench, which might be a few degrees under that of the other processes. It was pointed out that the process allowed no time for soaking, but Mr. Sweitzer stated that the process took a minimum of time, but sufficient to get the carbides into the solution before quenching. The time taken to get into solution—the soaking period—depends on the time taken to do the heat treating, and the finer the grain or structure, the more quickly it is done. With a widely dispersed material, it takes more time to get good homogenization.

PAPER: "Steel Wire: Some Recent Developments in Europe"
by Reginald S. Brown, Technical Dir.
Ryland Brothers Ltd.,
Warrington, England

**Relative** to mechanized descaling of rods, Mr. Brown stated that they were not using this process except for concrete reinforcing wire, but on the continent the process was widely used on rod for other applications. On wire to be galvanized there have been some difficulties. In drawing, 7-block machines are used. Some time back 5-block machines were employed for a 78% to 80% reduction. Cooling is so good today the 7-block machine has become popular in England.

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**On** patented stock the company has had only fair success in welding 85 carbon #000 rod, but the problem can be resolved. As to mechanical descaling and continuous patenting, the company started to do it, but abandoned it in favor of acid pickling with a 12% sulphuric acid solution, due to roping that occurred in the furnaces. We try to keep away from complications and we do a lot of electrolytic galvanizing, he said. Labor is skilled in this, but on the patenting lines they are not. For the tubular furnace no attempt is made to keep the wire from touching the walls.

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**In** the galvanizing process very little dross is formed. This is accomplished by having a minimum of metal in the pot and having no metal in contact with the zinc except the wire. A V-pot is used and where dross is formed, the wire is constantly taking it out, never allowing it to accumulate. This has only been used on 20 to 30 gauge wire in a small bath.

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**As** to the use of lime in continuous patenting, cleaning and coating of rod, the company has used lime and borax, the latter without too much satisfaction, but is now turning to bonderizing.

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**The** furnace is based on eight blocks, using 8 #000 rod or 8 No. 5 rod strands, etc., running at 34 to 36 F.P.M. Higher speeds have not been attempted.

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**In** galvanizing, Rylands uses a cold flux—number 20 normally, a double salt— and the hydrate settles out nicely and there is no turbulence from boiling flux. Wires are pre-heated to about 200°C, which dries the flux and helps to hold down the dross formation. Boiling flux always contains iron salts, hydrates and so forth.

CHAIRMAN OF MEETING
Fred A. Webber, Chief Metallurgist,
Wickwire Spencer Steel Div.
Colorado Fuel & Iron Corp.,
Buffalo, N. Y.

PAPER: "Introducing the Nailmaker"
by Richard J. Fisher,
National Machinery Co., Tiffin, Ohio

**As** to the life of the tools, like grippers, and the frequency of removal for cleaning, Mr. Fisher said it depended on the wire and the coating on it. It might be one, two or three days, depending on how

heavy the coating was. The tooling can be removed in a few minutes, dipped in the cleaning solution and replaced. They can't get out of line.

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**In** response to a question on the noise level of the machine, as compared with others, he stated that since they run twice as fast, the noise is slightly greater, but a sound-proof cover can be used to reduce the noise. Operators have always complained about the noise in a nail room and this could be further reduced by sound proofing the whole room. The noise pitch of the new machine is not higher, just more continuous.

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**The** wear on the header slides and grippers, he stated, is very slight, as they have hardened and ground liners, but when they show wear, they can be replaced or shimmed. It will not change the center line. The same is true of the pointing dies. These dies will run six or seven months before wearing as they are constantly lubricated under pressure. Some of the newest machines are equipped with an air line to blow out the abrasive materials.

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**As** to whiskers or nails jamming the magnetic conveyor, Mr. Fisher said that this was a problem at first, that has been overcome. This is a very new arrangement in which the magnets, instead of rotating with the belt, are now permanently stationery, resulting in no jamming whatsoever.

PAPER: "Automatic Coil Strapping"
by J. F. Beckman, Asst. Dir. of Sales
Signode Steel Strapping Co.,
Chicago, Ill.

**On** the matter of strapping large bundles, the speaker said that large bundles were thrown up by air, wrapped tightly and sealed in hand operations, all pneumatic. This operation was not shown in the picture. The machine can handle up to 60 inch coils, which was not available four years ago.

PAPER: "Spiral Wrapping Machines and Materials"
by Harold A. Myers,
President and Gen'l Mgr.
Rinkle-Krinkle Paper Co., Boston, Mass.

**A** questioner wanted to know whether the rip cord could be eliminated and a paper put over the spiral so that when the cord is pulled the paper would not scatter over the floor, possibly a glued or sticky wrap to hold the shreds together. Mr. Myers suggested a glued peripheral wrap.

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**As** to whether VPI papers have proven satisfactory, the reply was that they had been. He said that a periphery wrap of VPI had not worked out except for the outer coil layer, but a spiral wrap of this paper, while more expensive, offered complete protection. If the wrapping is done with dry paper in de-humidified rooms, in locations where there is a naturally moist atmosphere, the wrap will protect the wire even if it is not a VPI paper. This would be true for the Eastern Seaboard, but not necessarily so in the interior.

## DISCUSSIONS
## NON-FERROUS DIVISION TECHNICAL SESSIONS
### October 30, 1956

CHAIRMAN OF MEETING
Lester D. Fitler, Plant Engineer,
Rome Cable Corp., Rome, N. Y.

PAPER: "Certain Aspects of the Operation and Maintenance of Properzi Continuous Casting and Rolling Mill"
by V. G. G. Nayar, General Manager
and K. R. K. Nair,
Works Superintendent
The Aluminum Industries Ltd.,
Kundara, South India
and
PAPER: "The Progress of the Properzi Process"
by Frank R. Nichols, President
Nichols Wire & Aluminum Co.,
Davenport, Iowa

**A** question on how fine aluminum wire produced by this process can be drawn was answered by Mr. Nichols, who said most of the production was going for ACSR cable and quantities drawn to fine sizes were negligible. Regarding scrap, he stated that any such went right back to be re-melted.

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**Have** automatic controls been developed to control the metal level in the belt? It was stated that the new technique of immersing the tip in the receiving molten spool controlled the flow of metal rather than alternating the location of the wheel. No automatic control has been developed, but this offers an easy method of control, minimizing it. It does not require anyone to be in constant attendance at the machine.

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**As** to experience with conductor linings, there has been some difficulty in India, but little in the United States. The Carborundum Company has a new refractory called "Refrax" used as linings for the vertical and horizontal channels, that after 4 months of operation in pouring molten metal, were simply replaced. There was, however, no indication of penetration or erosion in the vertical liners, although in the horizontal ones it was very slight. These liners minimize build-up in the channels. The problem of ramming is something else and climatic conditions will affect it.

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**The** problem of casting copper has not been solved, but Mr. Properzi has been working on it for several years. It involves the matter of oxide pick-up, which affects conductivity. It is probable that it will be overcome and Mr. Nichols felt that success was near.

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**In** coiling the rod, a questioner asked if the rod rotated or just took the form shown. In Davenport, the speaker said, they use two

cans. The rod pours relatively slowly into the one to which the spout is directed and each coil is of the same diameter. Compared with high speed rod mills, the process is slow. The installations in Ireland and France produce rods continuously without any cuts. The Properzi system will handle high purity aluminum, but not aluminum alloys, which present other problems.

★ ★ ★

**While** Nichols Wire uses induction furnaces, other melting furnaces may be used, as is the case in Ireland, where electrical capacity is limited. As to whether there is any defect introduced from switching from one holding tank to the other, it was stated that there was not, as the metal going into the holding pot is clean. They have two holding furnaces filled from five induction furnaces, the holding pots containing about 75 pounds of metal.

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**Mr.** Nayar replied to a question on wire size, saying that they drew to about .052, with very little in smaller sizes, but when they start to make insulated conductors, they will draw down to smaller sizes. He also stated that they use Micro welders for butt welding.

★ ★ ★

**Answering** a question as to capital investment, Mr. Nichols said the equipment, including furnaces and rolling mills, would run about two hundred and fifty thousand dollars.

PAPER: "Zirconium"
by M. F. Judkins,
Mgr. New Products Div.
Firth Sterling, Inc., Pittsburgh, Pa.

**Tubing** is extruded into shells about 2 inches in diameter with a 3/16th to 1/4 inch wall thickness and drawn in a heavy pass over a mandrel from the side, said Mr. Judkins.

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**As** to plating, zirconium, like titanium, is a peculiar metal and can only be plated with difficulty. Experiments are being made to make coating deposits from a fused salt. It is not easy, but can be done. It is hard to put it on other metals. It is also hard to metal clad it, as it forms a very brittle substance with iron. These problems will be solved in a few years.

★ ★ ★

**Zirconium** and hafnium are separated by fractional crystallization of the phosphate, for one example, and by solvent extraction for another. It is not easy to separate them.

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**Alloys** have been developed by the Westinghouse Atomic Power Division for the AEC, but these are low alloys. Almost anything added to zirconium impairs its corrosion resistance. Around 2% tin is the principal alloying element, with fractions of one percent of iron, chromium and nickel. These alloys are used to give uniform behavior in hot water. Pure zirconium will not corrode and can be left in an atomic reactor for months. There is no diminution of its mechanical properties at high temperature—about 750°F. Zirconium combines readily with oxygen and the higher the temperature the more rapid the combination. It cannot be used unprotected in an oxygen atmosphere.

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**In** response to a question, he replied that the metal could be alloyed with aluminum and uranium, as well as a number of other metals. One of the properties of zirconium is that it is an excellent deoxidizer and the Germans used it for steel because of its activity. It has been alloyed with aluminum and magnesium to produce metals of unusual properties.

CHAIRMAN OF MEETING
Urbain J. H. Malo, Technical Director,
The Crescent Co., Pawtucket, R. I.

PAPER: "The Control of Insulated Wire Diameter"
by Charles M. Frederickson,
Asst. Plant. Supt.
Kaiser Aluminum & Chemical Corp.
Newark, Ohio
and Charles D. Gibbs, Sales Manager
Industrial Gauges Corp.,
Englewood, N. J.

**A** questioner inquired about the range of control for smaller diameter wires and stated that water on the wire from the cooling trough limited the accuracy of the gauge, especially on small wires. Mr. Frederickson said that their experience was principally on 2, 4 and 6 AWG size ranges and they have had little occasion to work on small sizes. Moisture effects could be controlled by air wipes. Mr. Gibbs said that good wipes were available and one company simply whips the water off. The use of guides and water removal methods is a matter for individual solution. Some vibration must be damped out.

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**Asked** if the gauge checked only one dimension, Mr. Gibbs said this was satisfactory since the wire tended to twist as it goes through the trough, so that several aspects of the wire were alternately checked. Up to now no one has rotated the gauge head. Wires down to .005 inches are regularly gauged.

PAPER: "Polyethylene Insulated High Voltage Power Cable"
by Victor Siegfried,
Power Cable Engineer
The Ansonia Wire & Cable Co.,
Ashton, R. I.

**Asked** about other than the environmental tests used to determine whether one has an ideal or is approaching an ideal coating, Mr. Siegfried said they did not, but that it would be determined by measuring the density of the material, the higher densities giving the best results. They have proceeded on the best advice of the raw material manufacturer, which was to keep it hot as long as possible, because there would be graduated cooling. The important thing was the transition from the 400° polymer down to the hot water. Theoretically, a very even transition is necessary for the highest crystallization. To go further would require an X-Ray technique on which tests have not been completed, but it seems like a good application and they have felt it was not necessary to await perfection.

★ ★ ★

**A** question as to whether the stiffness of low pressure polyethylene presented difficulties in

(*Please turn to page* 99)

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Galvanized
ROEBLING is a specialist in galvanizing, with practically unmatched facilities for producing galvanized wire in enormous quantities and in complete size ranges. Hot galvanized is available in sizes from .283″ to .035″... Roegal (drawn galvanized) from .187″ to .005″.
And Roebling galvanized wire can be packaged in the way most convenient and economical for you... in coil diameters of 60″, 30″, 22″, 16″ and 8″... on reels, spools or handy spoolless cores.
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Davis-Standard's Model DR50 Dual Reel Take-up increases the speed of reeling cable by changing from full to empty reel without stopping cable movement. Reel diameters from 24 to 50 inches can be accommodated.

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The DR50 provides easily adjustable constant-wind tension from 5 to 50 lbs. over wire build-up.

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D-S

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# The Story of the 1956 Annual Convention of The Wire Association

by Edmund D. Sickels
Editor
Wire and Wire Products
Stamford, Connecticut

**By** every standard the Twenty-Seventh Annual Convention held in Pittsburgh, Pa., at the Penn-Sheraton Hotel from October 29th through November 1st, was highly satisfactory.

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**Registration** started at 9 A. M. on Monday and by the end of the day some 425 persons had registered—the largest number ever recorded for the opening day. At the close of the Convention the total registration tallied 654 exceeding the 1955 attendance by about 50 persons. The figures included 404 members and 249 guests. Other statistics of interest are that 340 persons, including 18 ladies, attended the Annual Luncheon. 525 people were at the Stag-Smoker Dinner and Show. 212 tickets were sold for the Pittsburgh Steel tour and 94 for the Copperweld Steel trip. The hotel sold 546 rooms to our group.

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**One** of the noteworthy points about this years' Convention was the marked increase in attendance of non-ferrous wire and insulated wire men, so much so that our meeting rooms at times were crowded to capacity.

## Annual Meeting of the Board of Directors

**The** Board assembled at 10 A.M. on October 29th for its regular annual meeting and was called to order by President **Leslie C. Whitney.** A quorum being present, he called upon Secretary **Richard E. Brown** to read the minutes of the previous meeting, which was approved as read. Mr. Brown then read the financial report of the Association, showing a cash balance

Charles H. Williams, Jr.,
General Program Chairman.

on hand of $8000.00, which also was approved.

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**Reports** on the Regional Meetings in Kansas City and Los Angeles in 1956 were made by Mr. Brown and approved as read.

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**C. H. Williams, Jr.,** presented a report on the Annual Convention that was about to start, detailing the program features.

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**The** Stag-Smoker Dinner show, for which **Eber J. Hubbard** was responsible was described and expense therefor approved.

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**David M. Schmid** proposed that, in view of the development of the Non-Ferrous Division, the directors consider a separate medal award for the Division, the Medal Award Committee's membership to be expanded to include more men from this section of the industry.

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**The** question of Regional Meetings was discussed, resulting in a decision to hold a two-day meeting in Hamilton, Canada, on May 13 and 14, for which **Allan B. Dove** will be Chairman; a one-day meeting in San Francisco in June; and possibly a two-day Non-Ferrous meeting in the Spring under the direction of **James E. Flood,** the time, place and holding of which is to be decided.

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**The** next order of business was the appointment of a Nominating Committee for Directors. President Whitney appointed **Raymond S. Worth,** Chairman, with **James E. Flood, Tom M. Girdler, Jr.** and **Richard E. Brown** as members. For the Executive Committee he appointed **Grayson B. Wood, Jr.,** Chairman, with **Leonard C. Crewe, Jr., Charles H. Williams, Jr.** and **Richard E. Brown** as members. For officers, he appointed **S. Ray Snow,** Chairman, and **Ralph B. Roth, Allan B. Dove** and **Richard E. Brown** as members.

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**Mr.** Brown reported that as of September 30, 1956, the membership totalled 1200. He also stated that the 1957 Convention would be held in Chicago from October 14th through the 17th, with headquarters at the La Salle Hotel.

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**The** directors voted unanimously to elect **Clem L. McGowan,** Superintendent of Wire Mills, **Atlantic Steel Company,** an honorary director for life in consideration of his many valuable contributions to the welfare of the Association.

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**Mr.** Whitney's report to the directors, as the retiring president, traced the activities and events of the last year. It was approved as presented.

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**A** report on the results of the

letter ballot for new and re-elected directors was presented by **J. E. Donnellan,** showing the following elections: **Hugo W. Biskeborn,** Director of Manufacturing, **The Ansonia Wire and Cable Co., Glenn R. Lee,** Wire Mill Superintendent, **Continental Steel Corp., Earl R. Potter,** President and General Manager, **Industrial Wire Products Corp., A. M. Reeder,** Metallurgical Engineer, **Jones and Laughlin Steel Corp., John L. Sanderson,** Superintendent, Wire Mills, **Keystone Steel & Wire Co., Benoit J. Sirois,** Metallurgical Engineer, **Phelps Dodge Copper Products Corp.,** and **Charles H. Williams, Jr.,** Superintendent, Rod and Wire Mills, **Pittsburgh Steel Co.** These directors were formally declared seated by President Whitney.

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**S. Ray Snow** presented the nominations for officers for 1957 as follows: President: **Tom M. Girdler, Jr.;** Vice President, Ferrous Division: **Allan B. Dove;** Vice President, Non Ferrous Division: **James E. Flood;** and Executive Secretary: **Richard E. Brown.** The recommendations were put to a vote and approved.

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**Grayson B. Wood, Jr.** offered nominations for the Executive Committee as follows: **Leslie C. Whitney,** Chairman, and **Benoit J. Sirois, Raymond S. Worth, Tom M. Girdler, Jr., James E. Flood** and **Richard E. Brown,** members. The nominations were accepted, voted upon and approved.

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A resolution expressing regret at the untimely death of **Kenneth H. Davis** had been previously approved and Mr. Brown called attention to a memorial booklet that had been prepared for presentation to Mrs. Davis by **Earl R. Potter** at the Annual Luncheon. The preparation and cost of the hand lettered, illuminated book was duly approved.

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**Discussion** was held regarding the place for the 1958 Convention, culminating in a decision to hold it in Atlantic City or Philadelphia with a plant visit to the Roebling wire mills, the exact location to be determined as soon as possible.

**Mr.** Dove as Chairman of the By-Laws Revision Committee detailed a number of proposals for revision. These were discussed and approved and are to be submitted to a letter ballot to the Association membership.

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**Mr.** Brown presented a proposal made by **Reginald S. Brown** of **Rylands Brothers Ltd.** that the Association hold a meeting in England at some future date. The matter is to be taken under advisement and studied further.

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**The** meeting was adjourned at 12:45 P. M.

## The Directors Luncheon

**This** annual event is attended by invitation of the Board of Directors to all those who are participating in the various program activities, besides a few special guests. 64 were present.

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**At** the conclusion of the luncheon **Charles H. Williams,** General Program Chairman, introduced President Whitney, who welcomed those present and expressed his gratitude and that of the directors for the excellent work of the committees and speakers. Mr. Williams added his voice of appreciation to the speakers and committee members for their splendid cooperation.

## The Technical Sessions
## Monday Afternoon, October 29th

**The** technical sessions opened the Convention officially at 2:00 P.M. with a joint meeting of the Non Ferrous and Ferrous Divisions, over which **Frederick H. Parkin** of the **Parkin Chemical Co.,** Pittsburgh, presided. President Whitney welcomed the men to this Twenty-Seventh Annual Convention. He said that the success of our meetings could not be expressed numerically, but was based on the spirit pervading the meetings and the opportunities that all had for personal contacts with one another. He also called attention to the vast changes apparent in Pittsburgh since our last Convention there in 1948, pointing out the new buildings, the new parks, and the cleanliness of the city resulting from smoke control measures.

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**The** first speaker was **Joseph J. Kovaleski,** Sales and Application Manager, **The Coulter and McKenzie Machine Co.,** Bridgeport, Conn., who delivered a paper describing four possible capstan positions and the applications to which each is suited in this method of packaging wire.

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**J. D. Sprowl,** Department of Metallurgical Research, **Kaiser Aluminum & Chemical Corp.,** Spokane, Wash., spoke next on the subject of "Hot Dip Aluminizing Processes and Alloys." This paper described the several processes that have been developed to date.

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**The** session concluded with a paper on "The Use of Wire for Thermocouples and Accessories" given by **Marvin E. Thompson,** Plant Manager, The **Claude S. Gordon Co.,** Richmond, Ind., telling of the types of such products that have been found useful in wire mill processes. **Marvin R. Daniels,** Research Engineer, was co-author of the paper.

## The Ferrous Division Technical Sessions
## Tuesday Morning, October 30th

With **H. W. Waters,** West Mill Superintendent, Canada Works, **Steel Company of Canada Ltd.,** Hamilton, Canada, presiding as Chairman, the first paper was "Automotive Zigzag Spring Wire," by **W. J Van Horn,** Metallurgist, Rod and Wire Div., **Detroit Steel Corp.,** Portsmouth, Ohio. The speaker described two types of springs, the wire suitable for them and their manufacture.

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**Leonard A. Zucker,** President of the **Union Wire Die Corp.,** New York, N. Y., next presented a paper on "Industrial Diamonds in the Wire Mill", in which he discussed diamonds and diamond powders in their relation to drawing ferrous wires.

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**Closing** the session was a paper

entitled "The Steel Wire Industry in Australia" prepared by **J. K. MacDougall,** Consultant the Wire Mill Division of **Rylands Bros. (Aust.) Pty. Ltd.,** a subsidiary of the **Broken Hill Proprietary Co. Ltd.** The paper was delivered by the company's American Representative, **John A. Macpherson** of New York, N. Y.

### Tuesday Afternoon, October 30th

**Sterling Edwards,** President of **E. H. Edwards Co.,** South San Francisco, Cal., presided as Chairman of the Meeting.

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**The** first paper, "Heat Treating of High Carbon Steel" was presented by **N. D. Montgomery,** Metallurgist, Rod and Wire Division, **Pittsburgh Steel Co.,** Monessen, Pa., in which he described processes that his company had found productive of good results on high carbon steels.

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**He** was followed by **George A. Sweitzer,** Metallurgical Investigator, **Jones & Laughlin Steel Corp.,** Aliquippa, Pa., who spoke on the subject of "Electromatic Oil Tempered Wire", particularly detailing the use of the Trauwood Process.

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**Reginald S. Brown,** Technical Director of **Rylands Brothers Ltd.,** Warrington, England, brought the session to a satisfactory close with an interesting presentation entitled "Steel Wire—Some Recent Development in Europe." He returned this summer from a trip on the Continent, where he secured some important information.

### Wednesday Morning, October 31st

**Serving** as Chairman of this session was **Fred A. Webber,** Chief Metallurgist of the **Wickwire Spencer Steel Div. of The Colorado Fuel & Iron Corp.,** Buffalo, N. Y .

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**The** first speaker called upon was **Richard J. Fisher** of the **National Machinery Co.,** Tiffin, Ohio, whose paper, "Introducing the Nailmaker", described the results of the joint efforts of his company and industry to evolve a series of faster and quieter nail machines. A motion picture supplemented his talk.

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**J. F. Beckman,** Assistant Director of Sales, **Signode Steel Strapping Co.,** Chicago, Ill., spoke on "Automatic Oil Strapping", outlining the latest developments in this labor saving device for tying wire coils with little or no handling.

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**Harold A. Meyers,** President and General Manager of the **Rinkle-Krinkle Paper Co.,** Boston, Mass., closed the meeting with a paper, "Spiral Wrapping Machines and Materials", in which he laid particular stress on the type of papers suitable for wire coil wrapping and packaging.

### The Non-Ferrous Division Technical Sessions Tuesday Morning, October 30th

**Lester D. Fitler** opened the Non-Ferrous Sessions as Chairman of this meeting. He is Plant Engineer of the **Rome Cable Corp.,** Rome, N. Y.

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**The** first paper was one called "Certain Aspects of the Operation and Maintenance of the Properzi Continuous Casting and Rolling Mill" by **W. G. G. Nayar,** General Manager, and **K. R. K. Nair,** Works Superintendent, **The Aluminum Industries Ltd.,** Kundara, South India. The speaker, Mr. Nayar, was introduced by **Frank R. Nichols,** President of **Nichols Wire and Aluminum Co.,** Davenport, Iowa. Their experience with this rod machine was presented.

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**Mr.** Nichols followed with a paper of his own entitled, "The Progress of the Properzi Process," in which he described a new method of pouring the aluminum and a new larger cross-sectioned billet that greatly increases output.

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**M. F. Judkins,** Manager of the New Products Div., **Firth Sterling, Inc.,** Pittsburgh, Pa., delivered next a paper, "Zirconium", describing the processes of production and the applications of this relatively abundant and increasingly useful metal.

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**Robert E. Kass** and **Edward Lavin** of the Research Department of **Shawinigan Resins Corp.,** Springfield, Mass., presented a paper, delivered by Mr. Kass, on "The Effect of Salts in Formvar on the Dielectric Properties of Formvar Alkyl-Phenolic Coated Magnet Wire". This was the final paper of the morning session.

### Tuesday Afternoon, October 30th

**The** meeting opened at 2:00 P.M. with **Urbain J. Malo,** Technical Director of **The Crescent Company,** Pawtucket, R. I., serving as Chairman.

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**The** initial paper, "Control of Insulated Wire Diameter", was by **Charles H. Fredrickson,** Asst. Plant Superintendent, **Kaiser Aluminum & Chemical Corp.,** Newark, Ohio, and **Charles D. Gibbs,** Sales Manager, **Industrial Gauges Corp.,** Englewood, N. J. Mr. Fredrickson delivered the paper, which gave the results of tests made at Newark on diameter control.

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**Victor Siegfried,** Chief Engineer, **The Ansonia Wire & Cable Corp,** Ashton, R. I., and **Dr. R. V. Jones,** manager of Technical Services & Development, **Phillips Chemical Co.,** Bartlesville, Okla., were responsible for the second paper on "Polyethylene Insulated High Voltage Power Cables", Mr. Siegfried making the presentation. The paper dealt, among other things, with the use of low pressure polyethylenes for this application.

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**Don F. Christensen,** Electrical Section, Product Engineering Laboratories, **Dow-Corning Corp.,** Midland, Mich., presented a third paper, "Silicone Insulated Conductors", in which he outlined the properties and applications of silicone resins in electric wire manufacture.

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**L. F. Roehmann,** Senior Research Electrical Engineer, De-

partment of Metallurgical Research, **Kaiser Aluminum & Chemical Corp.,** Spokane, Wash., delivered the fourth and last paper of this session on the methods of "Measurement of Electrical Conductor Characteristics".

## Wednesday Morning, October 31st

**The closing session** of the Non-Ferrous Technical Sessions was presided over by **Raymond H. Dudley,** Chief Chemist of the **Whitney Blake Co.,** New Haven, Conn.

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**Theodore E. Veltfort,** Manager of the **Copper and Brass Research Association,** New York, N. Y., was asked to lead off with his paper on "Copper and Copper Alloy Wire for Mechanical Purposes". This paper defined the difference between these metals for conductor applications and mechanical purposes and gave the properties of the principal classes of the latter.

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**O. L. Burtenshaw,** Senior Metallurgist, and **R. E. Hutchinson,** Wire Drawing Superintendent, **Kaiser Aluminum & Chemical Corp.,** Newark, Ohio, had written a paper, "Drawing Quality Aluminum Wire", that was delivered by Mr. Burtenshaw. The authors described those factors in drawing and handling aluminum wire that enable their company to turn out good wire, free from flaws.

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**William C. Goodwine,** Sales Representative, **Tennessee Products and Chemical Corp.,** New York, N. Y., presented a paper, "Plasticizers for the Wire and Cable Industry", in which the categories of plasticizers for cable coatings were discussed.

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**M. K. Schurter,** Development Engineer, **Federal Wire & Cable Co. Ltd.,** Guelph, Canada, and **R. T. Gore,** Market Development Engineer, **Metal and Thermit Corp.,** Rahway, N. J., had prepared the final paper of the session, "Continuous Production Electroplating of Tin on Copper Wire Using Alkaline Potassium Stannate Bath", which Mr. Schurter presented. The paper outlined the procedures for the successful tin coating of wire by this process.

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**The** Wednesday morning meetings concluded the technical sessions.

## The Annual Luncheon Wednesday, October 31, 1956

**Approximately** 350 men and women attended the Annual Luncheon, to which President Whitney welcomed the assemblage, particularly extending a cordial greeting to those who had come to the Convention for the first time. He stated that this was an era of research and constantly evolving new developments, which was responsible for a large upsurge in new products and industrial materials.

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**Mr.** Whitney said that we are many in competition in our respective businesses, but here at the Convention we are united in one society, the success of which is due to the enthusiasm and cooperation of its members in advancing the interests of the wire industry as a whole. The Association, he pointed out, now numbers some 1200 members in 24 countries. He called upon **B. J. Sirois,** Vice President of the Non-Ferrous Division, who particularly stressed the development of the non-ferrous end of the Association and expressed his gratification at the noticeably increased attendance this year, so much so that their meeting room had been filled practically to capacity at all sessions.

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**D. M. Schmid,** Chairman of the Medal Award Committee, was called upon to present the Annual Medal Award, for which his committee had selected the paper by **Allan B. Dove,** Research Supervisor of the **Steel Company of Canada Ltd.,** for his paper: "The Influence of Nail Design and Manufacturing Practice on Joint Strength." This paper was considered the most meritorious contribution to the advancement of the wire industry in 1955.

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**Tom M. Girdler, Jr.,** Vice President, Ferrous Division, then presented a Certificate of Honorable Mention to **Dr. Fritz Schwier,** Chief Engineer, Wire Department, **Felten and Guilleaume Carlswerk,** Germany, for the outstanding ferrous paper of 1955 entitled "Stress Corrosion and Relaxation of High Carbon Steel Wire for Prestressed Concrete."

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**Representing** the Non-Ferrous Division, **Benjamin J. Sirois,** Vice President, then presented to **Robert O. Abbott, Jr.,** Assistant General Foreman, **Bristol Brass Corporation,** a Certificate of Honorable Mention for last year's best non-ferrous paper, entitled "Some Bending Characteristics of Cartridge Brass, 70%, and Yellow Brass, 65%, Wire."

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**Leonard C. Crewe** as Chairman of the Board of Past Presidents was called to the rostrum to make the presentation of appropriate certificates to those who in 1956 had been members of the Association continuously for the last 25 years. Such certificates were awarded to: **Kenneth R. Beardslee, Anson E. Beighley, Levi M. Cassidy, Phillip W. Grassel, S. J. Hammitt, D. Horsfall, Peter Igoe, Neil H. Knowlton, Robert H. Leach, Louis J. C. LePage, Randolph V. Miller, John C. Moston** and **Julian L. Schueler.**

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**President** Whitney asked an old friend and former associate of Ken Davis, **Earl R. Potter,** Director, to read a resolution of the Board of Directors memorializing the work of **Kenneth H. Davis** in the Association. He had been selected to give the Mordica Memorial Lecture for 1956, but had passed away on July 10, 1956. The resolution, beautifully hand lettered and illuminated, was presented to Mrs. Davis at the close of its reading.

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**Mr.** Whitney then called upon **Robert H. Davis,** now President of **The K. H. Davis Wire and Cable Corporation,** Los Angeles, and son fo **Kenneth H. Davis,** to present the Lecture, which was entitled "Fulfillment of a Trust." This he did impressively with great credit

to his father's memory.

## The Annual Meeting of Members

**At** 4 P.M. on October 31st, the Annual Meeting of The Wire Association, more than a quorum being present, was called to order by President Whitney.

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**The** first order of business was the reading of the minutes of the last meeting and the presentation of the Treasurer's report by **Richard E. Brown,** Secretary-Treasurer. Both reports were approved as read.

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**In** his report covering the two years for which he served as president, **Leslie C. Whitney** called attention to the increased interest and attendance at our Regional Meetings. He felt that the Association has a great amount of untapped ability of which greater use should be made. Tribute was paid to Allan B. Dove for instituting the Oxford System for the selection of award winners and expressed his personal satisfaction at the organization of the Insulated Wire Section of the Non-Ferrous Division.

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**Mr. Whitney** said that **Dick Brown,** more than any other single individual, had been responsible for the growth and success of the Association and that since he had expressed a desire to retire, his replacement would be difficult. He declared that he had enjoyed the experience of being president for the last two years, but that credit for any progress made belonged to the officers, directors and others who had cooperated so wholeheartedly.

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**Mr.** Brown discussed at some length the new Insulated Wire Section and the work that other societies and organizations are doing for the wire and cable industry. He pointed out that the Signal Corps' Wire and Cable Symposium is the biggest thing in the matter of attendance and that Wire and Wire Products publishes the papers presented that are considered of interest to our members as they are made available.

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**Mr.** Whitney, as his last official act, then turned over the chair to the newly-elected president, **Tom M. Girdler, Jr.,** with his good wishes for a successful administration of the affairs of the Association.

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**Mr.** Girdler took the chair and thanked Mr. Whitney and said that he had done an admirable job as our chief officer, fulfilling his responsibilities with dispatch, efficiency and dignity. He called for a motion to record the thanks and appreciation of the membership for the work of the 1956 Program Committee. This was duly made, seconded and approved. A motion was then made to ratify the actions of the officers and directors in the year past. This was unanimously approved.

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**Appointments** for the 1957 Program Committee were announced by Mr. Girdler as follows: General Program Chairman: **John L. Sanderson;** Ferrous Program Chairman: **John H. Corson;** and Non-Ferrous Program Chairman: (to be announced later).

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**After** calling attention to the request that the Association hold a meeting in England, which was followed by considerable discussion and explanation, the general tenor of which was favorable, a motion was made to adjourn. On approval, the Annual Meeting of Members adjourned at 5 P.M.

## The Stag Smoker-Dinner and Show

**This** traditional annual event, preceded by a hospitality hour in a large room adjoining the Ball Room, where the dinner and show were held, was attended by 525 men.

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**The** crowd, and we mean the crowd, was in a mood of jovial and festive good spirit. The Ball Room doors opened at 7:30 P.M. and the dinner was over and cleared away by 8:45, ready for the show.

**The** early part of the Smoker-Dinner Show was somewhat marred by the unexpected introduction of amateur talent. Instructions have been issued that will avoid a repetition of a similar circumstance in the future.

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**The** professional show itself, which, as often happens, involved some audience participation, was excellent and enthusiastically enjoyed. We are all much in the debt of **Eber J. Hubbard,** President of the **Hubbard Spool Company,** for his efforts as Chairman of the Entertainment Committee in procuring and staging so fine a group of acts.

## The Ladies

**Mrs. Leslie C. Whitney** and **Mrs. Charles H. Williams** had arranged a number of interesting events for the ladies who had come with their men-folk. On Monday afternoon they took them on a tour of the **H. J. Heinz Company;** on Tuesday they were the guests of the **Copperweld Steel Company** for lunch at the University Club; and after attending the Annual Luncheon on Wednesday, later on at 6 P. M., were the guests of the **Standard Industrial Compounds Company** for cocktails and then for dinner at the Ankara, a supper club in the suburbs. The Mmes. Whitney and Williams proved to be delightful and gracious hostesses and their many kindnesses were heartily appreciated.

## The Plant Inspection Tours Thursday, November 1, 1956

**Two** trips had been planned to Pittsburgh area wire mills. One of these was to the Glassport plant of the **Copperweld Steel Company.** Busses left the hotel in the morning carrying just short of 100 members and guests.

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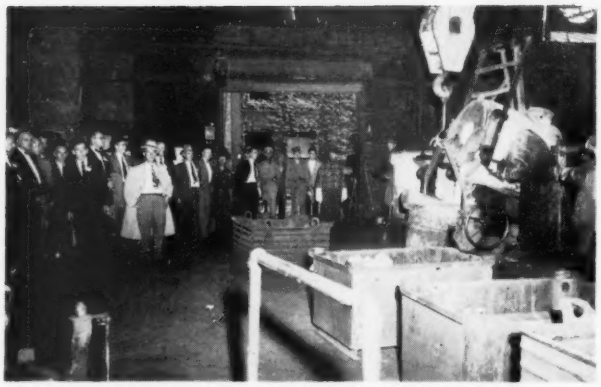
**People** were allowed to go through the plant "on their own" following a course marked by arrows painted on the floor. At each different operation along the way, Copperweld personnel were stationed to answer questions, which proved to be a highly satisfactory

Members of The Wire Association arriving at Copperweld Steel Company Plant, Glassport, Pa.



Watching copper being poured from a furnace into a ladle at the Copperweld Steel Plant.

arrangement.

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**The** first thing seen was a graphite mold in which a steel billet approximately 6 inches in diameter by 4 feet long is carefully centered with ceramic wedges. Such a billet is thoroughly cleaned before insertion and then placed in a furnace and brought to a white heat.

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**When** the steel arrives at welding temperature, the mold is removed from the furnace and molten copper poured into the space between the mold and billet. This, upon cooling, becomes the billet from which "Copperweld" rod is hot rolled and cold drawn into wire, the ratio of copper to steel always remaining the same, regardless of the degree of reduction.

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**As** their guests progressed they saw the billets being cut to length, the copper melting furnaces breathing fire, the pouring and the casting. The hot rolling operations followed next in sequence. From there the people progressed through the pickling, wire drawing, annealing, maintenance, product forming and shipping departments. At each operational juncture, local testing and checking stations have been set up, the central laboratory having been spread out in this manner some time back for greater speed and efficiency and to stop any trouble that may have arisen before it can pass to the next step of processing.

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**Among** the products that are made at Glassport are wire strand, rope, power conductors, telephone wires of various kinds, signal bonds, weatherproof wire, ground rods and clamps, insulator ties, nails and staples and fencing and barbed wire.

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**Following** the tour, the group was taken to the Ankara for lunch and after a satisfying repast, were given an opportunity to meet Copperweld Steel's directors and officers, who joined the gathering for lunch, having just come from a morning meeting. Leslie C. Whitney, our host, introduced **Frank R. S. Kaplan,** Chairman of the Board, who expressed his great pleasure at having the group with them, extending a cordial invitation to return at any time.

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**The** other tour, on which the conventioneers interested in steel wire production went, visited the Monessen plant of the **Pittsburgh Steel Company,** a little farther to the South on the Monongahela River.

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**Somewhat** more than 200 persons went on this trip by bus, leaving the Penn-Sheraton Hotel at 9 A. M. Association members and guests were welcomed by **Charles H. Williams, Jr.,** Pittsburgh Steel's Superintendent of the Rod and Wire Mills, and other company officials. Their visitors included not only persons from all parts of the United States and Canada, but from many foreign countries as well.

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**The** Company guests were conducted through the Wire Mill and the Construction Products Depart-

(*Please turn to page* 90)

Members pause in the Fence Department to watch manufacturing process at Pittsburgh Steel's Monessen plant.

Quality Protected
...Costs Reduced
AT
SOUTHWIRE COMPANY
CARROLLTON, GEORGIA
They report that Elgin Diamond is easier to work with and results in a lower finishing cost per die. That's because Elgin Diamond is precision graded for particle uniformity and contained in a color-identified, lubricant-type vehicle. There's no waste, no mistakes, no loss of cutting efficiency. Why not protect your product's quality like others do . . . with Elgin Diamond.
ABRASIVES DIVISION
Dept. G
ELGIN NATIONAL WATCH COMPANY
ELGIN, ILLINOIS
ELGIN
DIAMOND
DYMO-C
ELGIN DIAMOND

# The Diamond Jubilee of Consolidated Edison Underground Cable

by David Williams, Manager
Cable Bureau, Purchasing Department
Consolidated Edison Company of New York, Inc.
New York, New York

**Mr. Williams delivered this interesting portrayal of the development of underground cable at a meeting of the Wire and Cable Section of the National Electrical Manufacturers Association at the Society's Annual Convention in Atlantic City, N. J., on November 14, 1956. It is published through the courtesy of NEMA and the author.**

**The** year 1956 is of peculiar interest to the wire and cable industry in general and the NEMA Wire & Cable Section in particular, because the first underground conductors for the transmission and distribution of electricity for incandescent lighting were manufactured and installed by Thomas Alva Edison in New York City just 75 years ago. This paper will present a brief history of the growth of the wire and cable industry in general and a more detailed history of the growth of the Consolidated Edison cable system.

## Early Uses of Wire and Cable

**The** Wire and Cable industry of the United States may be said to have been born with the invention of the telegraph by Samuel F. B. Morse in 1837. It is now a billion dollar industry. Bare copper wire was used on the first telegraph lines, but was soon replaced with iron wire of less conductivity, but of greater tensile strength. However, it soon became evident that reliability of service required that the wires be covered or insulated. The early forms of insulation consisted of cotton cloth saturated with beeswax, paraffine, or gum shellac; and various compounds of gutta percha, and rubber. Morse used an unvulcanized rubber insulated submarine cable between the Battery and Governor's Island, N. Y. in 1841.

* * *

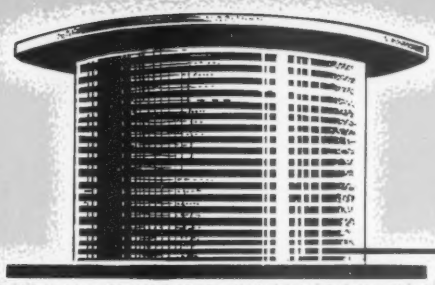
**To** the Kerite Company of Seymour, Connecticut goes the honor of developing the first commercially successful wire to be insulated with an extruded compound containing rubber in 1866. A dry paper-wrapped wire (the forerunner of the modern telephone cable) was made in 1872 by John H. Wortendyke of Richmond, Va. for use on the electric bell system in his home, but it was not commercialized until E. O McCracken who had obtained a patent on September 2, 1884, formed the Norwich Insulated Wire Company, which was subsequently (1891) acquired by the National Conduit & Cable Company (a predecessor of Anaconda Wire & Cable Company). The telephone, which had been invented by Alexander Graham Bell in 1875 inaugurated the second great expansion in the wire and cable industry.

## Use for Direct Current Light & Power

**By** the time the Electric Light and Power industry was born, the wire and cable industry was a full-fledged infant supplying its products for telegraph, telephone and signalling purposes. The first wires for electric arc lighting were installed overhead in the Summer of 1878 by Jablochkoff along the Avenue de l'Opera in Paris, France, and the first such wires in the United States were installed in the Loeser & Company Department Store in Brooklyn, New York, on December 16, 1878. Other early uses of wire for electric are lighting occurred on:—(a) April 29, 1879 when Brush Arc Lamps were demonstrated in the Public Square, Cleveland, Ohio, (b) September 1879 when the first Arc Lighting Central Station in the world was opened in San Francisco, California by the California Electric Company (a predecessor of P.G. & E. Co.), (c) Sept. 1880 when the first such station was opened in New York City by the Brush Electric Illuminating Co. of N.Y. (one of the predecessor companies of Consolidated Edison), (d) Dec. 18, 1880 when Broadway from 14th St. to 34th St. was illuminated by arc lights.

* * *

**The** big impetus to the wire and cable industry came with Thomas A. Edison's invention of the first practical incandescent lamp on October 21, 1879. Contrary to the existing practice of the telegraph, telephone and arc light companies, who installed their wires on poles above ground, Edison decided to put his wires underground, after having installed the first 120 volt overhead distribution system at Menlo Park, N.J. on January 1, 1880. He applied for a patent on January 28, 1880, which wasn't granted until August 30, 1887. However, on November 2, 1880, Edison demonstrated the first 120 volt direct current underground distribution system at Menlo Park, New Jersey, and on February 14, 1881 formed the Edison Tube Works (predecessor of the General Electric Company Wire & Cable Department) to make his 2 Wire Tubes at 65 Washington Street, New York. The construction consisted of, "half-round copper rods, which, after being served with rope wound in a long spiral over



# WIRE Recorder

REG. U.S. PAT. OFF. MONSANTO CHEMICAL CO.

*News of Interest to the Wire and Cable Industry*

MONSANTO

PUBLISHED BY MONSANTO CHEMICAL CO., PLASTICS DIVISION, SPRINGFIELD, MASS.


## New Cars Wired For Power

The '57 automobiles now making their debut across the country represent a billion dollar investment in engineering and restyling by Detroit's manufacturers. This is an ambitious attempt to outdo the record year of 1955 when the American public eagerly drove 7.2 million new cars out of dealers' showrooms. The trade prediction is for rising sales reaching a peak of eight to ten million new cars a year by 1965.

As a result of this bullish thinking. consumers will see and enjoy many innovations: new styles and designs, new color combinations and important mechanical changes underneath all the frosting on the cake. A great many of the structural and engineering advances in the new 1957 car have been made possible by new techniques and materials in which the plastics industry in particular has played a most important part.

All of the new cars have one thing in common which is important to the wire trade: — "Power" equipment. These new electronic devices add to the driver's comfort, convenience and safety: automatic light beam dimmers, power seats, power windows, power steering, and air-conditioning are just a few. Even so-called "low price" models are coming off the production lines equipped with standard electrical components which only a few short years ago were only engineers' dreams or available only in higher priced luxury models. In 1957 the smallest car on the road will be flexing its electronic muscles, too.

*Experimental automobile interior designed by Pratt Institute students under the direct supervision of Monsanto Market Development Department points up increased use of modern plastics in the car of tomorrow.*

## American Aviation's Billion Dollar Gamble

Few, if any, segments of American industry have been left out of the tremendous surge being made by the American aircraft industry. Airlines, aircraft manufacturers and thousands of their suppliers have joined hands in the biggest business gamble in world history. What is actually going on is a billion dollar investment in the future of air travel. The goals are new products, equipment and techniques to lower air ticket fares and reduce air travel time. The key is the jet airliner of the future, almost completely off the drawing board.

The rush to jets, started by all major airlines approximately one year ago, has not bogged down. It has simply become enmeshed in the throes of necessary technical details, of research, design and development, each calling for the best brains, time and money available. Already a terrific investment has been made in prototypes and mock-ups of American jet airliners to insure world wide supremacy for American air ships. While the British aircraft industry started off with a tremendous rush, it nosedived with an equally tremendous and literal crash with the wreckage of the early Comets. The bid by Britain's big jets for supremacy in world air travel is still not to be discounted. However, the comparatively slower start of the American aircraft industry provided time to solve many of the new problems posed by the giant size and weight of the new airliners on the ground before getting airborne. Each day of this continuing research has added up to a staggering investment without, as yet, one cent of financial return.

At the present time, most mechanical problems have been solved. Prototypes of these giant planes have been successfully flown. Mock-ups of interiors have been planned and designed and tested for utmost comfort and safety. Some jet airliners, so large as to completely dwarf the main carriers we see on the runways today, will dominate the commercial airlines, carrying three to four times as many passengers as at present to destinations around the world in less than half the time. The biggest business gamble in history, a billion-dollar investment spread over the machine industry, metal working, and electronics fields is about to pay off.

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Wire Recorder
newsletter

Recent opening of the first telephone cable between the U. S. and Europe is expected to lower rates and boost Trans-Atlantic conversations substantially. The $42 million cable which carries 36 telephone conversations simultaneously, triples existing radio telegraph service, eliminates interference, and according to an AT&T spokesman "makes a chat with a friend in London or Europe as distinct as a talk with your next door neighbor." Changes in our radio listening fare are also due. Radio networks on both sides of the Atlantic welcomed this new service as they'll now be able to send each other programs over the cable. You soon may be hearing a BBC concert at the same time it's heard in London. We can also expect clearer reports from the network's foreign correspondents whose news broadcasts are frequently ruined by fading radio waves. It should be gratifying that the trend away from wire and cable has reversed itself with recognition that wire transmission is still better for high fidelity.

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The Civil Aeronautics Authority has budgeted $250 million over the next five years to provide adequate air navigation, communications and traffic control for the nation's growing aircraft population. Most of the quarter billion dollar budget is earmarked for additional facilities: 44 additional airport surveillance radar locations; 51 additional radar approach control units; 51 new long-range radar installations and substantial increases in secondary radar units; 28 additional instrument landing systems. Other equipment planned includes foreign aeronautical communications stations and interstate airway communications systems.

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The electric power industry is expected to grow as much in the next ten years as it has during its entire three-quarter century history. The accelerated rate at which our economy is expanding will mean a jump in kilowatt hour consumption from the current rate of 600 million hours annually to 2 billion hours a year by 1966. To meet this demand the U. S. power industry will have to boost generating capacity to 275 billion kilowatts from the present installed capacity of 130 million kilowatts. Experts also predict that much of this new power will be nuclear, and that in less than twenty years almost all new large power plants will be nuclear.

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Savings and loan associations account for one bright spot on the tight money market. According to some experts close to the industry, mortgage lending by the associations may go up this year. Net savings in the associations are running higher this year than last--and noticeably so. Money coming in for mortgage repayments is also increasing. This boosts their loan kitty, putting them in a better position to make construction loans than had been generally expected. As more than one-third of residential building is financed by these associations, (they're the biggest single source of home-building funds) home-builders and home-buyers alike are hoping that the forecasters are right.

## *Electronics Patent Applications Double*

The U. S. Patent Office is currently issuing electronic patents at a rate which almost doubles that of 1955. Records show 3,084 patents issued for the first half of '56 as compared to 3,130 in all of '55.

This record pace is indicative of the phenomenal growth of the electronics industry from a $700 million business to a $6.8 billion goliath in the past 10 years. There is no indication that the pace is slowing up. To the contrary, industry leaders are currently spending, and have earmarked, more for plant expansion and new product development than ever before.

All major phases of American industry have been effected by and have contributed to the growth of this relatively new industry. This is especially true of the makers of insulated wire and related suppliers, who have developed new and improved materials, more efficient insulators and conductors. Current newspapers, magazines and business publications reveal the number and variety of new electronic products, developments and techniques reaching the market. Here's a quick rundown on a few news stories and articles which appeared in recent weeks.

### *"Picture-Phone" Developed By Bell Labs*

A telephone that transmits pictures along with sound has taken a big step toward commercial feasibility according to Bell Telephone Laboratories. Scientists and engineers at the Bell System's research and development organization have used an experimental picture phone system to transmit recognizible pictures over short and long distances, even as far as from New York to Los Angeles.

### *"Teller Vision" Takes Curbside Deposits*

Closed circuit television and an underground pneumatic tube enable a teller in a Bridgeport, Connecticut savings bank to transact business with motorists more than 100 feet away. Developed by Mosler Safe Company, the system allows banks to add to service without opening a branch.

*continued on page 4*

## Carbon Black and Polyethylene
### Effect on Electrical Properties

To stabilize polyethylene satisfactorily against ultra-violet degradation (which causes chain scisson and results in embrittlement of polyethylene and loss of physical properties) during exposure to outdoor weathering, it is desirable to add a small amount of well-dispersed carbon black which acts as an ultra-violet ray absorber. While such weather-stable polyethylene is normally used only in such applications as cable jacketing where superior electrical properties are not a prime requisite, wire and cable manufacturers have been interested in the degree to which carbon black alters its electrical properties.

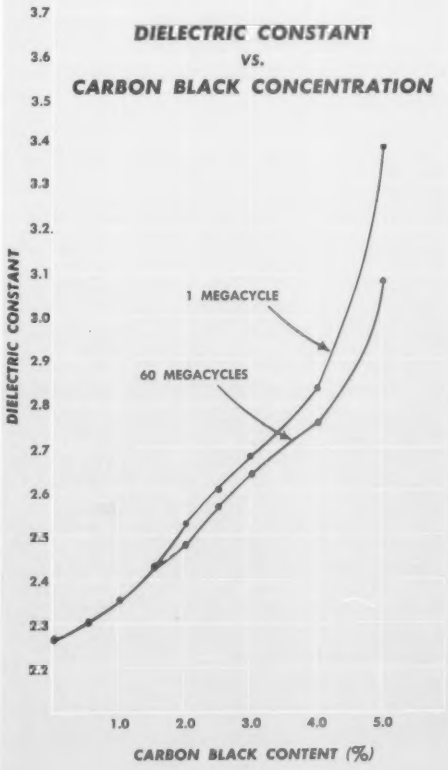
Because polyethylene is such an excellent insulating material, its electrical properties will generally be downgraded by the addition of other materials in compounding operations. Two of the electrical properties most commonly measured to judge the insulating qualities of a polyethylene compound are dielectric constant and dissipation factor.

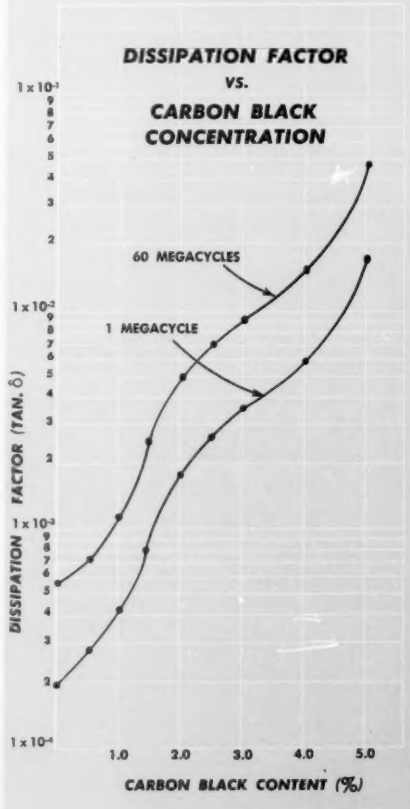
The dielectric constant of a material is the ratio of the capacitance of a capacitor using that material as the dielectric to the capacitance of the same capacitor using air as the dielectric. Dielectric constant, therefore, can be considered a measure of the tendency of a dielectric to store electrostatic energy.

Dissipation factor is defined as the tangent of the dielectric loss angle ($\tan \delta$) and is proportional to the energy totally lost by the system to the dielectric material due to absorption.

Two graphs are presented here which show the effect of carbon black on both dielectric constant and dissipation factor for carbon black concentrations ranging from 0 to 5%. Measurements were made at frequencies of 1 and 60 megacycles per second.

The low dielectric constant and dissipation factor characteristic of polyethylene has led to its use in a large number of applications requiring an insulation with optimum dielectric properties: primary insulation for voice transmission, signal transmission, and radio frequency cables.



*continued from page 3*

### *Electronics Speeds News Coverage*

Estimated at 45 million homes, the U. S. television audience was treated to two weeks of highly coordinated programming during the conventions of the Democratic and Republican parties. Radio broadcast signals covering the earth originated from these same conventions in Chicago and San Francisco respectively. Countless telephone and teleprinter circuits were set up to help spread the news. A special facsimile circuit using Times and Facsimile equipment was used to transmit newspaper pages from New York to San Francisco.

### *RCA Unveils TV Tape Player, Light Amplifier, Silent Air Cooler*

Three new electronic developments which may be placed on the market within five years were displayed by scientists of the Radio Corporation of America. The developments are:

(1) Equipment to heat or cool a room silently by electronic panels with no moving parts. Also a noiseless electronic refrigerator.

(2) Magnetic tape player that reproduces television programs through standard television receivers.

(3) An electronic light amplifier that increases up to 1000 times the brightness of a projected image including X-ray images of stationary objects.

### *Fish Swish Around in Current of New Electronic Devices*

Fish are living longer — if not better — electrically. The Department of Interior's fish and wild life service is using electricity to help protect the fish from harm until he's big enough to be eaten and then to help catch him after he is big enough. Right now Uncle Sam's fish experts are plugging in electronic devices to count adult fish as they wriggle up-stream to inland spawning grounds, prevent little fish travelling down-stream from swimming over dam spillways and into turbine blades and protect the commercial fish "crops" from two deadly enemies, Alaska's huge Kodiak Bear and the vicious Great Lakes eel known as the sea lamprey.

The nature of the products and developments, and the accelerated rate at which they're being introduced would seem to indicate that our Yankee ingenuity is still with us. The difference is that today's inventors are benefiting from some new "tools" and materials — electronics know-how, modern research facilities and dollars to back up their experiments.

## COMPUTERS NOW BIG BUSINESS

Since the first commercial installation of an electronic computer by the Census Bureau in 1951, this new industry has grown by leaps and bounds. Today some 50 manufacturers have delivered more than 3000 electronic computers and calculators to science, engineering and business — another 2000 are on order. With the increase in computer sales there is little question where a great deal of future production of insulated wire will go.

With the experts uncovering new jobs for these complex machines every day, and many businessmen just beginning to appreciate the potential of the computers, sales should continue to soar for some time.

According to industry sources many executives in business have been slow to adapt these electronic wizards to their operations. However, in recent months the pace has quickened, with executives in all ranks of business hiring consultants and seeking information from educational institutions and management centers to determine how computers can fit into their operation.

Competition has prompted much of this new interest. According to some executives a computer in the hands of a competitor improves his competitive position, leaving him little choice but to follow suit.

Part of the computer boom can be traced to small business. More and more small and medium sized firms have found that a computer can speed up their order processing, production scheduling and research operations. A few years ago not many would suspect that a firm of less than 50 people could make profitable use of a computer. However this is the case with a New York state optical firm. A rented computer has cut their inventory control staff in half while the number of items handled has increased threefold.

This is not an isolated case. Throughout the country smaller firms are planking down the high rental fees and purchase prices for time and money saving computers.

While most of us are constantly amazed by the output and tasks performed by today's computers, manufacturer's research departments are busy developing even more efficient machines. These new models, which will perform more jobs for industry, coupled with the increasing use by smaller businesses, are expected to keep manufacturers and their suppliers busy meeting demand.

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### *Are You On Our Mailing List?*

Each month people who are interested in the wire industry receive a personal copy of the *Wire Recorder*. If you would like your own name, or others in your firm, added to the *Wire Recorder* mailing list, please drop a card to **MONSANTO.**

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each of them, were placed with the flat sides towards each other and again served with rope to hold the two together. This couple was then inserted into a length of iron pipe 6" shorter than the conductors. An insulating compound was forced thru the pipe, completely filling the unoccupied space and serving further to insulate the conductors from each other as well as from the enclosing pipe." The pipes and the necessary splicing boxes were then buried in the street.

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**Installation** of the first 2 Wire Tubes began on April 19, 1881, and by the end of the year 30,000 ft. containing 57,000 lbs. of copper had been laid. By July 27, 1882 the footage had increased to 80,000, and by the end of the year a total of 95,000 ft. of such conductors had been installed in a one square mile area. The original system emanating from the historic Pearl St. Station, which was opened on Sept. 4, 1882, consisted of 10½ miles of mains containing 44,000 lbs. of copper, and 20 feeders 4.42 miles in length containing 136,000 lbs. of copper, or a total of 15 miles of tube containing 180,000 lbs. of copper. Feeder sizes varied from 262,951 **cm** to 1,269,419 **cm** per conductor; mains sizes varied from 33,015 **cm** to 262,951 **cm** per conductor. Some of the 2 wire feeders were in use until 1895 and the 2 Wire mains until 1903.

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**In** 1883 Edison demonstrated his 240 volt 3 wire system at the Louisville Exposition. This was a marked improvement over the 2 wire system, permitting an increase in the economic service area from a radius of ½ mile to a radius of one mile at a reduction of 62½% of the copper previously required. The mains sizes were 150 MCM, 200 MCM and 350 MCM; the feeder sizes were 400 MCM to 1,000 MCM, the neutral being one-third the area of the live legs. The 3 wire tubes used round copper rods and were made by the Edison Tube Works, which had moved in 1883 to 18 Bridge St., Brooklyn, N.Y. and then in Dec. 1886 to Schenectady, N.Y. where the last tubes were made Sept. 22, 1922. The first commercial installation was made at Brockton, Mass., but it did not go into service until after the one at Sunbury, Pa. was placed in service on July 4, 1883.

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**Installation** of the 3 wire system was begun in July 1887 in the Second District of the Edison Electric Illuminating Co. of N.Y., and by the end of 1891 much of the 2 wire system in the First District had been converted to the 3 wire system. This system was also installed in the territory of the Edison Electric Illuminating Co. of Brooklyn in 1889 where a mile is still in service. The Annual Report of The Edison Electric Illuminating Company of New York dated January 15, 1889 stated, "there is already in use in the cities of New York, Boston, Philadelphia, Detroit, Rochester, Columbus and Chicago upwards of 180 miles of these tubes."

## Alternating Current Transmission & Distribution

**In** the meantime, Gaulard & Gibbs had in 1883 invented an Alternating Current System of Distribution in Europe. George Westinghouse brought it to the U. S., installing the first experimental installation, consisting of 4000 ft. of Single Phase, 3,000 Volt A.C. at Great Barrington, Mass. on March 16, 1886, and the first Commercial A.C system in Buffalo, N.Y. on Nov. 30, 1886. Westinghouse formed the Safety Electric Light & Power Co. (another predecessor company of Con Ed) in 1887 to introduce the A.C. system into New York and the first installation (Single Phase, 1000 Volt, 133 cycles) was made in 1889.

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**The** next significant development came with Nikola Tesla's invention of the Polyphase A.C. System, the first 3 Phase, 4-5 KV line being installed in March 1893 at Hartford, Connecticut. This system was publicly demonstrated by Westinghouse at the Columbian Exposition, Chicago, Illinois, on May 1, 1893. The first 2 Phase, 2400 Volt 60 Cycle A.C. overhead line was installed in Brooklyn, N.Y. in 1895, and the first such underground line was installed in New York in 1896. Overhead transmission voltages increased rapidly thereafter and now run as high as 330,000 Volts.

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**The** developemnt of underground cables was expedited by the New York State Legislature, which in 1884 enacted a law requiring the placement underground of "all telegraph, telephonic and electric light wires and cables used in any incorporated City of this State, having a population of five hundred thousand or over." The Consolidated Telegraph & Electric Subway Co. was formed in 1885 to install underground conduits in New York, and the Brush Electric Illuminating Co. went underground on August 1, 1888. But it wasn't until 1890 that the City Fathers forced the removal of **all** overhead wires in Manhattan. Edison's D. C. Tube System was already underground, so his competitors had to develop a flexible cable suitable for installation in underground conduits, and other types of insulation for the higher voltages at which they operated.

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**The** early experience with rubber had been unsatisfactory, because some of the cables had been installed adjacent to steam mains. The Standard Underground Cable Company (one of the constituent companies of General Cable Corp.), which had been formed by Westinghouse developed a cable insulated with a fabric wrap impregnated with paraffin, lead covered, which was more satisfactory. As the art of vulcanizing rubber was perfected, rubber insulation was increasingly used on underground cables. The Edison Co. installed its first D. C. underground cable in 1892 (0.7 mile), its first 3 x 4/0 6600V, 3 Phase 25 cycle cable in Brooklyn in 1897, and its first D.C. concentric cable in 1899 (4 miles). These were rubber insulated cables and were not superseded by paper insulation until 1901.

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**Altho** oil impregnated paper insulated telephone cable had been in use since May 1888, the first paper

insulated underground conductors for power transmission were installed and operated at 10,000 volts by Ferranti between Deptford and London, England in 1890. This was in effect an extension of the Edison Tube idea, but the conductors were concentric copper tubes insulated from each other by wide sheets of brown paper steeped in Ozokerite wax and placed inside 20 ft. lengths of iron pipe which were then buried in the ground. The success of this installation led in 1894 to the introduction of paper insulated lead covered power cables in the U. S., the National Conduit & Cable Co. shipping large amounts of 5000 volt paper cable to England and Ireland in 1895. The Chicago Electric Light Co. (now the Commonwealth Edison Co.) purchased the first 3 conductor 4500 Volt paper lead cable in 1897, and the first 13,000 Volt paper insulated cable was made by the National Conduit & Cable Co. and installed in Minneapolis and St. Paul, Minn. that same year. Voltages of underground cable have increased to 230 KV in the U. S. and 400 KV in Sweden.

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**In** June 1897 a 3 x 250 MCM Rubber Insulated Cable was installed between Brooklyn Edison's Pearl St. Generating Station and the Coney Island Rotary Converter Substation, 12 miles distant. In Nov. 1898 a similar cable was installed between the New York Edison Duane Street Generating Station and a 2500 KW Rotary Converter at the West 39th Street Station. These developments led to the abandonment of Edison's original plan to build 36 - 480 KW generating stations in the 12 square mile area south of 59th St., and the substitution therefor of the idea of a giant Waterside Generating Station supplying substations thru high voltage transmission lines. Hence, on October 24, 1901 Waterside #1 Generating Station went into service.

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**The** first transmission cables radiating from Waterside Generating Station were 3 x 250 MCM 6,600V. paper insulated, using Round stranded conductors for connection to 2500 KW Rotary Converters at the Substations. In 1908, Sector shaped conductors were developed in the U. S., and on Dec. 10, 1910 the New York Edison Co. purchased its first 3 x 350 MCM Sector paper insulated 6,600V. cable for connection to 3500 KW Rotary Converters. The sector shape made it possible to use 40% more copper without increasing the overall diameter of the cable.

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**In** 1913, underground transmission voltages were raised to 7,800V. and 15,000V. In 1915, the highest voltage paper insulated cables then made, 24,000 Volts, were installed between Sherman Creek Generating Station and West Farms Substation. In 1921, the voltages of the existing transmission cables were raised from 6,600V. to 11,000V. on the 25 cycle system, and from 7,800V. to 13,200V. on the 60 cycle system. Changeover of the 60 cycle system was completed in 1923 and of the 25 cycle system in 1925. The insulation on the existing cables had sufficient factor of safety to permit satisfactory operation at the higher voltages.

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**In** October 1922, the first 27,000 volt paper insulated underground cables were installed between Hell Gate and Hudson Ave. Generating Stations. On April 28, 1923 the first single conductor 45,000 volt cables were installed from Sherman Creek Generating Station to New Rochelle Substation. They, however, proved unsatisfactory, and were replaced the following year by cables purchased from the Societa Italiana Pirelli, Milan, Italy, which were entirely satisfactory, operating at the highest voltage then in use. The superior results obtained from the Pirelli cable compelled American Cable manufacturers to modernize their methods of impregnating paper insulated cables, which, while satisfactory for voltages up to 15,000 had proven unsatisfactory above that level.

30 YEARS OF PROGRESS IN HIGH VOLTAGE
UNDERGROUND TRANSMISSION CABLE
SOLID TYPE "H" CABLE
First Purchased: 12-23-25
15KV 3x#2/0 AWG to 3x800 MCM
27KV 3x#2/0 AWG to 3x600 MCM
35KV 3x500 MCM
LOW PRESSURE, GAS or OIL-FILLED CABLE
First Purchased: Oil 9-23-35
Gas 5-23-39
15KV 3x#2/0 AWG to 3x800 MCM
27KV 3x500 MCM & 3x600 MCM
46KV 3x500 MCM (Oil)
69KV 3x350 MCM & 3x500 MCM (Oil)
TYPE "H" SUBMARINE CABLE
First Purchased: 7-12-37
15KV 3x350 MCM Solid
29KV 3x600 MCM Oil-Filled
LOW PRESSURE OIL-FILLED CABLE
First Purchased: 138KV 6- 9-25
69KV 2-28-50
69KV 1x2000 MCM
138KV 1x 600 MCM to 1x1500 MCM
HIGH PRESSURE PIPE TYPE CABLE
First Purchased: 138KV 7-10-46
69KV 2-28-50
69KV 350 MCM to 1500 MCM
138KV 350 MCM to 2000 MCM

**Then** came an epoch-making order on June 9, 1925 for 190,000 ft. of ¾" hollow core single conductor 600 MCM 132 KV Pirelli oil-filled cable for installation between Hell Gate Generating Station and Dunwoodie Substation—12 miles distant. Half of this cable was made at the Pirelli plant in Milan, Italy and the balance at the G.E. Co. Schenectady, N. Y. factory. Shortly thereafter, Commonwealth Edison Co. of Chicago, Ill. ordered 6 miles of the same cable, which was placed in service on June 1, 1927, the New York installation being delayed by construction difficulties until August 9, 1927. Thus, to Chicago goes the honor of having been the first Company in the world to operate underground cable at 132,000 volts. A duplicate of the New York cable, using a 1/2" hollow core was ordered on February 13, 1929, completely manufactured at the G. E. Schenectady, N. Y. factory, and placed in service on October 31, 1929. Both lines have given perfect service, without a single electrical service failure since installation!

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**The** success of the Pirelli oil-filled design for single conductor 132 KV cables led to its introduction into the three-conductor cable field, which had been pre-empted by the "Belted" construction from 1901 until 1920 when the first Type "H" construction in the world was used on a 25 KV cable installed at Fall River, Mass. On the New York Edison system the Belted cables for 6,600V and 11,000V operation used 5/32" paper on each conductor and a 5/32" belt of paper overall. For the 27,000V cables, the conductor insulation was 9/32" and the belt 4/32". When 27 KV Type "H" cables were purchased in 1926, the conductor insulation was 11/32" with no belt, each conductor being shielded by a copper tape and the three conductors held together by a bronze or steel binder tape. In September 1935, the first 27 KV 3 conductor oil-filled cables were ordered from General Electric Co. and General Cable Corp., the conductor insulation being only 6/32", with oil channels in the interstices between the shielded conductors.

**In** an effort to reduce the cost of cable accessories required for oil-filled cable, General Electric Co. developed the Gas Filled cable, in which nitrogen gas was used in the channels instead of oil. The first 27 KV Gas Filled cable was ordered in May 1939, the Conductor insulation being increased to slightly less than 8/32". As the result of the foregoing technological developments, the copper size of 3 conductor 27 KV cables used in existing 4" ducts, has been increased from 350 MCM to 600 MCM.

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**In** the meantime, the Okonite-Callender Cable Co. had been developing a radically different type of high voltage underground cable, called "Oilostatic," in which the paper insulated single conductors were pulled into a steel pipe buried in the ground, the pipe then being filled with insulating oil under a pressure of 200 lbs. per sq. in. The first such installation for 132 KV service in the United States was made at the Plymouth Meeting, Pa. station of Philadelphia Electric Co. in October 1932. Con Edison installed its first 132 KV Pipe Type cable in conjunction with Long Island Lighting Co. between Jamaica and Valley Stream, L. I. on February 28, 1948. Because of lower installation costs, Pipe Type cable, either under oil or gas pressure, has superseded the Pirelli type in the United States. In 1954 the voltage of Pipe Type cable was increased to 230 KV for an installation by the Okonite Co. for Sao Paulo, Brazil, and another by Phelps Dodge Copper Products Corp. for Garrison Dam, N. D. Voltages on the Pirelli type cable were increased to 400KV in 1952 for a Swedish installation, and in 1954 to 301 KV for Canada.

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**It** is interesting to note that the Pirelli oil or gas filled cable construction was anticipated by J. J. C. Smith, who in 1885 invented the first hollow core cables in the world. Also in 1885, David Brooks of Philadelphia, Pa. developed the first oil filled pipe type underground cable system in the world. Both inventors however, were far ahead of their time, and so their inventions died aborning.

★ ★ ★

**On** December 21, 1948 orders were placed for two 69 KV Pipe Type Cable feeders and two 69 KV 3 conductor Oil Filled Type Cable feeders to connect East River Generating Station to Cherry St. Substation. This was the first 69 KV cable installation on the Consolidated Edison system. and the two different types of cable were selected to obtain comparative cost experience. Savings of 10% in installed costs in favor of the Pipe Type cable led to its use on all future 69 KV installations. However, one manufacturer is now developing a gas-filled 69 KV cable with an aluminum sheath instead of a lead sheath, which may eventually swing the pendulum the other way.

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**Thus,** over a period of 75 years the voltage of cable for the transmission and distribution of electrical energy in the United States has increased from 120 volts to 330,000 volts on overhead lines, and from 120 volts to 230,000 volts on underground lines. These lines transmit electrical energy from giant thermal and hydro-electric generating stations to the most remote hamlet. the transmission distance having been increased from the 1/2 mile of Edison's original Pearl St. Station to over 300 miles at the present time. In a few short years electrical energy will be transmitted from commercial thermo-nuclear generating stations.

★ ★ ★

**The** growth of cable on the Consolidated Edison system may be visualized from the following comparisons: — The area served has grown from one square mile in lower Manhattan, serving 59 customers, to 300 square miles in New York City proper, serving a population of over 8,000,000, and 300 square miles in adjacent Westchester County, serving a population of over 600,000. The mileage of overhead wire and cable has grown from the one mile on Broadway in 1880, to a maximum of 37,000 miles in 1930. At the present time the overhead lines comprise 30,000 miles, because of the gradual replacement of over-

head lines by underground lines, which have grown from 6 miles in 1881 to 54,000 miles at the present time. In terms of copper consumption, the Consolidated Edison overhead system has grown from the 1,000 lbs required for the original Broadway Arc light installation of 1880 to 41,000,000 lbs. installed as of December 31, 1955. The underground cable system has shown an even greater growth, i.e., from 57,000 lbs. in 1881 to 269,000,000 lbs. installed as of December 31, 1955.

★ ★ ★

**While** the total copper in cable installed on the Consolidated Edison overhead and underground system as of December 31, 1955 thus totals 310,000,000 lbs., technological and system changes have required the procurement of over 531,000,000 lbs. of copper in the various types and sizes of cables used on such a vast and complex system. It is interesting to note that it took 42 years to accumulate the first 100,000,000 lbs. of copper, 6 years for the 2nd, 4 years for the 3rd, 12 years for the 4th (this was during the depressed 1930's), and 10 years for the 5th, 100 million (World War II slowed the rate).

**The** weighted average prices of copper prevailing during the foregoing five periods were as follows:

| | |
|---|---|
| 1st period, 1880-1922 inc. | 16¢ lb. |
| 2nd period, 1923-1928 inc. | 14¢ lb. |
| 3rd period, 1929-1932 inc. | 12¢ lb. |
| 4th period, 1933-1944 inc. | 10¢ lb. |
| 5th period, 1945-1954 inc. | 23¢ lb. |

★ ★ ★

**The** price of copper has since gone up to 46¢ per lb., but dropped to 40¢ on July 10, 1956. A great impetus has, therefore, been given to: (1) operation at higher voltages, thereby reducing the amount of copper required, (2) the substitution of less expensive aluminum for copper wherever economically feasible, Consolidated Edison has been one of the leaders in adopting higher voltages for both underground and overhead lines, and in November 1951 made its first purchase of aluminum cable for overhead and underground use. While the usage of aluminum cable on the Consolidated Edison system has been slow, because few extensions to overhead lines are being made, and space restrictions in congested underground facilities are limiting factors, the future holds promise of a gradually increasing use of aluminum cable.

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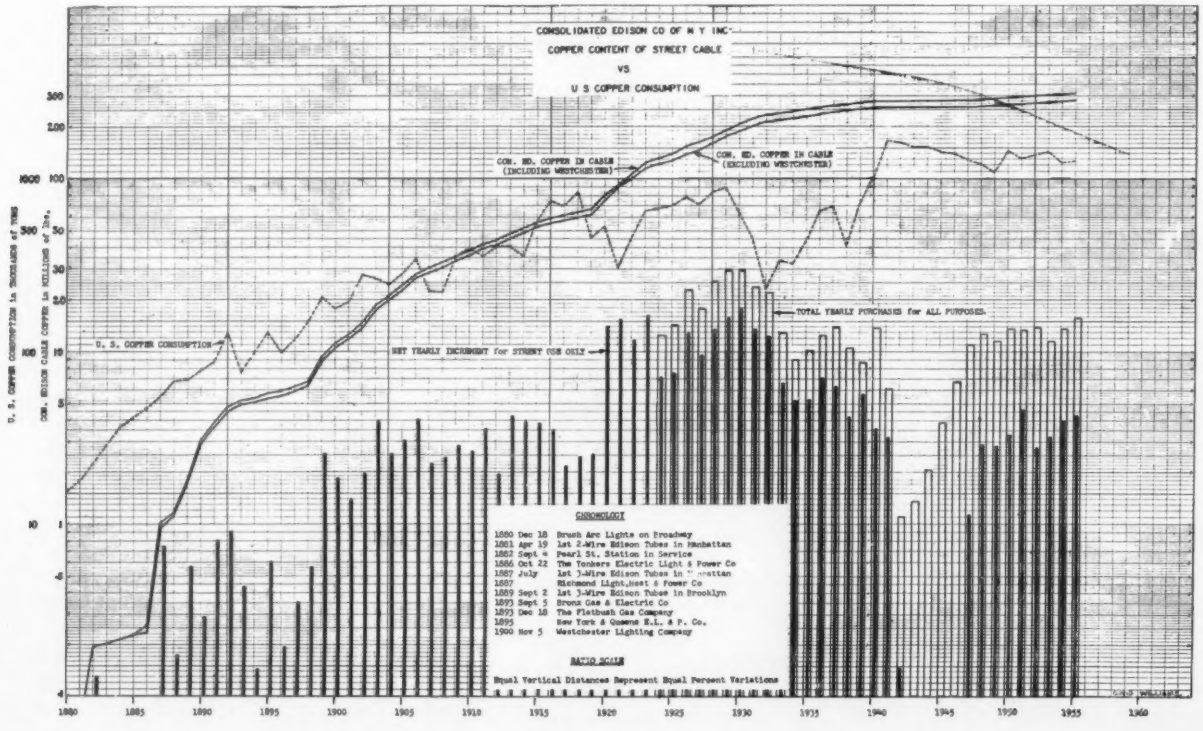
**New** developments in high voltage cable for the Consolidated Edison system consist of the use of aluminum in place of lead sheaths, the use of silicone rubber for Generator Leads, the use of polyethylene in place of paper insulation, and the use of High Internal Gas Pressure Cable in place of High Pressure Oil Filled Pipe Type Cable. Thus, Consolidated Edison is continuing the pioneering spirit evidenced 75 years ago when Thomas Alva Edison designed the first commercially successful underground cable. The remarkable progress achieved over the years is a tribute to the effective cooperation that has always existed between Consolidated Edison and its cable suppliers. This continued cooperation will insure even greater progress in the future.

## Historic Development of Electric Transmission & Distribution Lines Compiled by David Williams of Consolidated Edison 10-10-56

### I—Overhead Lines

| | |
|---|---|
| 1877 | 1st Public Exhibition of a Street Arc Light in U.S.: Newark, N. J. (Weston) |
| 1878 Summer | 1st Street Arc Light Line in World: Avenue de |

(*Please turn to page* 94)


CONSOLIDATED EDISON CO OF N Y INC.
COPPER CONTENT OF STREET CABLE
VS
U S COPPER CONSUMPTION
CON. ED. COPPER IN CABLE (INCLUDING WESTCHESTER)
CON. ED. COPPER IN CABLE (EXCLUDING WESTCHESTER)
U. S. COPPER CONSUMPTION
NET YEARLY INCREMENT for STREET USE ONLY
TOTAL YEARLY PURCHASES for ALL PURPOSES
CHRONOLOGY
1880 Dec 18 Brush Arc Lights on Broadway
1881 Apr 19 1st 2-Wire Edison Tubes in Manhattan
1882 Sept 4 Pearl St. Station in Service
1886 Oct 22 The Yonkers Electric Light & Power Co
1887 July 1st 3-Wire Edison Tubes in Manhattan
1887 Richmond Light,Heat & Power Co
1889 Sept 2 1st 3-Wire Edison Tubes in Brooklyn
1893 Sept 5 Bronx Gas & Electric Co
1893 Dec 18 The Flatbush Gas Company
1895 New York & Queens E.L. & P. Co.
1900 Nov 5 Westchester Lighting Company
RATIO SCALE
Equal Vertical Distances Represent Equal Percent Variations

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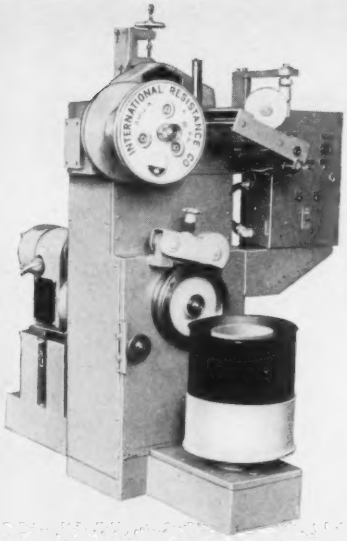
## FOR CONTINUOUS WIRE PACKING & DRAWING




- Combination drum or spool take-up and rewinder.
- Shown for single wire.
- Adjustable for tension, pitch and amplitude of traverse.
- 12" spool shown. 30 to 150 lb. drums.

**MODEL C-100 TAKE-UP**

- Shown with single drive mounting to 16 wires .008" to .051"
- Enameling, annealing, galvanizing, tinning, etc.
- Containers 30 to 150 lbs.

**MODEL C-500 TAKE-UP**

- Shown with tandem drive mounting 8 wires each side .020" to .250".
- Galvanizing, patenting, enameling, etc.
- Drum or adapter weights 200 to 1,000 lbs.

**MODEL 138-A DRAW BLOCK**

- Single draft wires .016" to .375"
- "Draw-cast" die box shown gives adjustable positive cast control. Also available in other sizes.
- Process adapters to order — drums to 1,000 lbs.

Inquiry specifying the application which is of interest to you will result in prompt and courteous attention.

Pat. No. 2,732,060. Other U.S. and foreign patents pending.

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# Fume Elimination for Wire Enameling Ovens

by R. J. Ruff, President
Catalytic Combustion Corporation
Detroit, Michigan

In many industries, the installation and operation of required air pollution control equipment is placing an increasingly heavy burden on manufacturing costs. For instance, over 10% of the investment in a new foundry may be assigned to air corrective devices, which collect contaminants having no reclaim value, and which require subsequent disposal of the collected material. Until recent years, it was generally believed that the wire enameling industry required similar increases in production costs in order to produce an effluent from wire baking ovens which would be acceptable to our more discriminating neighborhoods and communities. Today, fume elimination from wire enameling ovens is a simple by-product of more profitable plant operations. The development of the Catalytic Fume Combustion Process, and its subsequent improvement through cooperation of the wire enameling industry, has resulted in placement of emphasis on longer runs between shut-downs, better oven performance, less maintenance, reduced fire hazard, and heat recovery, while improved community relations are becoming a secondary consideration. Existing facilities in each plant may place limits on the extent to which these returns are practical, and therefore, this report will review other types of air pollution control employed on wire enameling ovens, their influence on plant performance and fume control, as well as the manner in which improved results are obtained through catalysis.

R. J. Ruff

**This paper was presented before the Wire and Cable Section of the National Electrical Manufacturers Association at its Annual Convention in Atlantic City, N. J., on November 12, 1956, and is published through their courtesy.**

**In the paper, Mr. Ruff describes the several methods available to accomplish fume elimination, dwelling particularly on the process in which catalysts are employed.**

## Oven Operation

In order to fully appreciate the factors involved in the selection of suitable air correction equipment, it is desirable to review briefly the baking process as it relates to the oven exhaust gases. As the coated wire enters the oven, the low boiling solvents, such as napthas and xylols, are first quickly vaporized. Upon further heating of the wire to its final baking temperature, which may vary from 500 to 700 deg F., the higher boiling-point organic acids, oils and some of the resins are vaporized and enter the oven atmosphere. While being retained at oven temperature, partial pyrolysis, or "cracking" occurs, resulting in the formation of aldehydes and other unsaturated hydrocarbons, with the characteristic eye and nose irritating effects. The resultant mixture of gases contains an extremely complex range of hydrocarbon and organic compounds, whose boiling point varies from perhaps 50 deg. F. to over 350 deg. F.

So long as the fume laden gases are maintained at temperatures above approximately 400 deg. F., the contaminants remain in a pure gas phase, and are colorless. As the fumes leave the oven and are cooled—either by infiltration of room air, or radiation losses from ducts—condensation of the higher boiling-point material occurs. This condensation results in the formation of air-borne droplets (aerosols) with the characteristic bluish-white stack effluent. Some of these droplets adhere to the interior of the exhaust ducts, and fans, causing gradual reduction in exhaust volume, with corresponding increase in fire hazard. Since constant exhaust volume is also desirable for maintaining uniform oven baking characteristics, damper adjustments become necessary, in addition to periodic shut-down for cleaning. An oven shut-down is expensive, causing scrap wire, broken spools, clean-up time, loss of productive labor and re-heating costs. Estimates vary from $100.00 to $500.00 per machine interruption. Therefore, air corrective devices which eliminate condensate formation will return their investment many times during the life of an oven by permitting reliable, uninterrupted, oven operation.

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## Conventional Corrective Methods

Industrial air corrective equipment is usually developed for specific purposes. Each type employs one or more of the many known physical or chemical laws of separating and collecting, destroying, or otherwise rendering innocuous the contaminant in an air stream before discharge to the atmosphere. The characteristics of the contaminants and practical considerations of the wire enameling operation place limits on the list of

possible devices that may be employed. For instance, it appears that the entire range of dry collection equipment, such as cyclones, electrostatic precipitators and filters, is inapplicable. Equipment in this category has been developed over a period of years for the specific purpose of dust collection. It would appear reasonable, also, to exclude gas coolers (by cold air dilution or heat exchange) with subsequent absorption systems. Aggravation of the condensate and cleaning problems, and increased fire hazard would result from employment of either of these methods. Conventional fume control methods which have been employed include:

## Dispersion

**This** is usually accomplished by means of tall stacks, and where practical, by employment of high velocity outlets. The obvious function is to discharge the effluent at a sufficient elevation to minimize the return to ground level at or near the plant area. Stacks up to approximately 150 feet high are in use, and have eliminated complaints from the immediate plant neighborhood.

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**Economic** considerations demand manifolding a rather substantial number of small ovens to a single stack, which increases the condensation problems and fire hazard.

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**Tall** stacks are normally not recognized as counter-measures for combustible type fumes where area wide pollution control regulations are in effect. Therefore, consideration for their installation should be made only when there is reasonable certainty that new regulations will not quickly force their obsolescence.

## Water Scrubbing

**Conventional** wet-type collectors as used in other industries employ a multiplicity of methods to cool, condense, wet and remove the contaminant from the air stream. When designed for application on wire enameling ovens, in excess of 90% of the condensible resins and heavy oils in the oven exhaust gas can be removed, and condensate collection in ducts minimized. If a generous quantity of refrigerated water is employed, an appreciable portion of the lower boiling-point solvents may also be collected. However, a substantial portion of the eye irritating aldehydes, and the disagreeable odorous compounds will remain in a gas phase for discharge to the atmosphere.

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**Employment** of scrubbing requires consideration of the disposal of contaminated water and collected materials. Many cities now have regulations prohibiting the discharge to sewer of solvents, oils and phenols, and scrubbing may involve the required addition of a separate liquid disposal, or solvent recovery system.

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**Well-designed** water scrubbers for the exhaust gases of wire enameling ovens will meet the approval of air pollution control regulations in some areas, but will not meet the demands in others. Logically therefore, anticipated, as well as existing regulations, require evaluation prior to their selection.

## Direct Flame Incineration

**Since** the contaminants in the exhaust air of wire enameling ovens consist of hydrocarbon and organic compounds, they are, by nature, combustible. The end products are water vapor and carbon dioxide — odorless, colorless, and harmless gases. The fumes are not flammable by usual interpretation, since the concentration of energy is too low to burn by flame on a self-sustaining basis. Therefore, in order that the oxidation reaction is permitted to occur, the oven exhaust gases are preheated by a gas or oil burner. Independent tests, carried on rather extensively by several wire enameling plants, show that incinerator discharge temperatures from 1400 to approximately 1700 deg. F. (with some variation depending on type of enamel) will produce an effluent free of contaminants. Since combustion is essentially complete, when operating at these temperatures, a well-designed direct flame incinerator will undoubtedly meet all present and anticipated air pollution control regulations. In addition, the condensate problem following the incinerator is eliminated, and there is no subsequent disposal problem. Operating cost would appear to be confined to fuel consumption. Heat calculations indicate that the thermal demands for the incinerator will range from perhaps 1½ to 4 times that of the oven itself, and is, therefore, the primary deterrent to more extended use.

## Catalytic Fume Combustion

**Oxidation** by catalysis results in the same end products as direct flame incineration, since both methods involve combustion principles. The basic difference consists in the introduction of a catalyst, which accelerates the fume burning process, permitting the oxidation reaction to proceed at about 500 deg. F. As the fume burning temperature now approaches the oven exhaust temperature, little preheating is required, and frequently only during oven starting conditions.

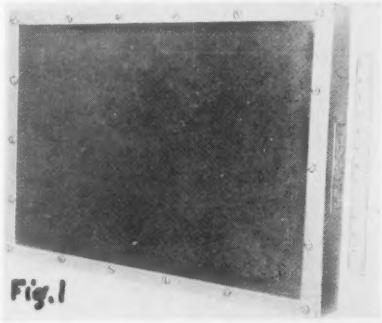

Fig. 1

**In** appearance, the catalyst, as shown in Figure 1, is similar to an air filter element. Precious metals are deposited on thin ribbons of nickel alloy, which are crimped in the form of a mat, and conditioned for activity. Similar activated screens form the entry and discharge surfaces, and the mat is held in an alloy channel container. The catalyst is light in weight, unbreakable, readily and quickly removable, can conveniently be washed if and when needed. Since the catalyst and its supports are both of metal, having similar expansion characteristics, there is no spalling of the cata-

lyst surface. A considerable number of these catalyst elements are now exceeding 15,000 hours of operation on wire enameling ovens, without requiring factory service.

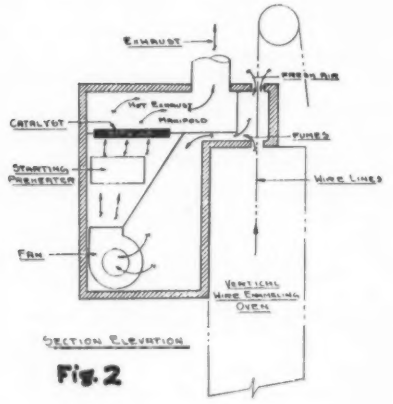

Fig. 2

A typical mounting arrangement for the Catalytic Combustion System on a vertical wire enameling oven is shown in Figure 2. An abrupt temperature rise occurs as the fumes are directed through the catalyst, as a result of fume combustion. This additional heat is then employed to prevent formation of condensate around the top wire slot of the oven and to maintain proper catalyst entry temperature without the use of auxiliary heat, once started. Ventilation volume remains constant, eliminating the need of oven damper adjustments. Systems of this design have been in continuous operation for periods of over three years without the need of a shut-down for any condensate cleaning purpose.

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**While** the individual fume combustion system, as shown in Figure 2, provides the operating flexibility desirable for the larger ovens, small ovens have been successfully manifolded to a single fume combustion system with arrangements similar to Figure 3. The double manifold arrangement prevents formation of condensate in the main collection header. Heat exchange to the fume stream is provided from the oxidized gases. Where heated factory make-up air is required a heat exchanger is installed between the double manifold and the stack connection.

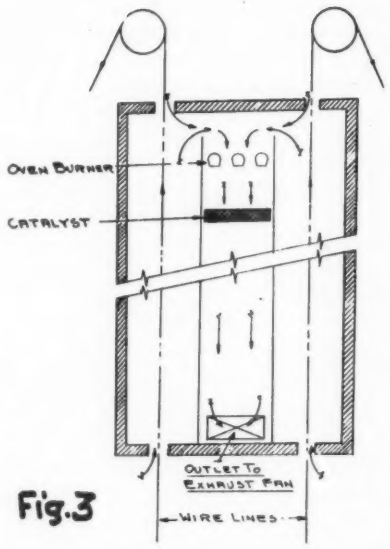

Fig. 3

**Since** it has become a well-recognized fact that the heat energy represented by the solvents is usually more than is expended in the oven baking process, the question of utilizing the heat from fume combustion for the baking operation is frequently raised. For new oven designs, this is accomplished by the use of an air recirculating system. A method presently in use is shown in Figure 4, although arrangement details will vary with individual oven designs. When running most wire gauges and coatings, an oven of this type will continue to maintain its controlled temperature with the oven burners or electric heaters reduced to little or no output. Modification of existing ovens to accomplish heat recovery requires individual study A typical oven, which may readily be adapted to the addition of catalysts is shown in Figure 5. More frequently, the existing oven design will require major surgery, in which case external disposal

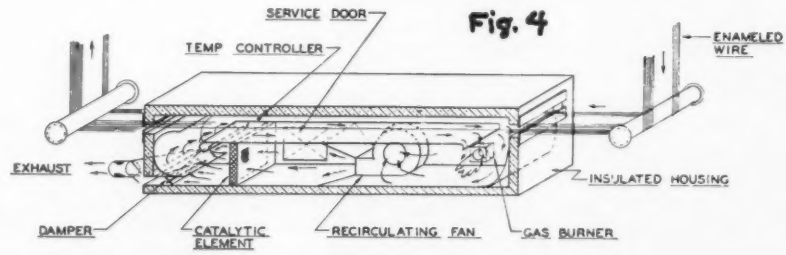

Fig. 4

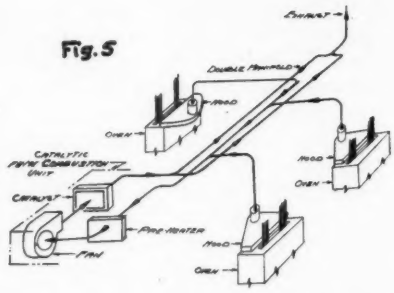
Fig. 5

by the individual or manifolded arrangement, as already described, is recommended.

## Summary

**Of** more than 500 wire enameling ovens now equipped with catalysts, representative installations are in use employing all methods described. Other oven operations in the electrical manufacturing industry where catalysis has been successfully employed include coil baking, core-plate enameling, fabric and paper impregnation. Depending on the adaptability of existing equipment, the following advantages can usually be expected:

**Shut-down for inspection or cleaning confined to an annual or semi-annual basis.**

**Heat recovery to factory make-up air, or to the ovens.**

**Improved working conditions, since destruction of the fumes prevents their re-entry from stack outlet into the work-room.**

**Greater plant safety through reduced fire hazard and monitoring of fume concentrations.**

**Improved oven operation of precision control of ventilation.**

**Fume elimination at low operating cost, as will meet all present and anticipated air pollution control regulations.**

★ ★ ★

**If** indirect savings are disregarded, the speed with which the initial investment can be recovered

(*Please turn to page* 98)

# NEMA's Annual Convention in Atlantic City

**The** thirtieth annual convention of the **National Electrical Manufacturers Association** opened on November 12th with more than 500 representatives of electrical manufacturing companies in attendance.

★ ★ ★

**The** 5-day meeting started with a round of technical discussions among the sixty-two product groups of the Association and a special 3-day program for members of NEMA's Wire and Cable Section.

★ ★ ★

**Ralph J. Cordiner,** president of **General Electric Company,** and one of the nation's leading industrialists, addressed the first general membership luncheon on Tuesday. He stated that this year's output of electrical goods would total $20 billions and that in another 20 years, at today's prices, the market should be about $90 billion. Labor rates, he said, have gone up 178% since 1948 and material costs have risen 163%, whereas prices on electrical machinery have advanced 100% and on home appliances only 41% on the average.

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**New** officers were elected Wednesday morning and presented to the membership at a luncheon meeting that day. Other features of the Wednesday luncheon included the presentation of 50-year certificates to three industry leaders and the award of **James H. McGraw** medals to two manufacturers who, according to a special committee, have done more than any others in giving "unselfishly of their time, their thought, their energy and their spirit to promote the interests of all electrical men." **Arthur A. Berard,** president of the **Ward Leonard Electric Co.,** Mt. Vernon, N.Y., was announced as NEMA's new president.

## All-Industry Programs

**Following** luncheon, electrical manufacturers viewed a first-time presentation of a professionally staged and cast dramatic review of all-industry sales promotional programs now in progress. The major project, directed by **N. J. MacDonald,** president, **The Thomas & Betts Co.,** co-featured a supporting cast of four NEMA company representatives.

★ ★ ★

**Included** were **C. W Higbee,** manager, Electrical Wire and Cable Department, **United States Rubber Co.; R. J. Sargent,** general manager, Marketing and Distribution, Consumer Products Division, **Westinghouse Electric Corp; Hoyt P. Steele,** president, **Benjamin Electric Manufacturing Co.** and **A. Callaway Allen,** sales manager, Electrical Division, **Wagner Electric Corp.** Their "spot appearances" were in the interests of programs geared to such markets as electrical equipment and wiring in the home, in commercial fields and in farm and rural areas, in support of the National Electrical Week program.

B. F. Ilsley, NEMA's New Wire and Cable Section Chairman

**Once a year the various NEMA sections gather together for their Annual Convention. Sections hold separate meetings, but come together for general luncheons and an annual dinner. On these occasions the membership can see, hear and meet their officers. The Wire and Cable Section also held its own dinner on one of the opening evenings.**

## Wire and Cable Section Meeting

**B. F. Ilsley,** General Manager, Wire and Cable Department, **General Electric Co.,** Bridgeport, Conn., was elected chairman of the Wire and Cable Section of NEMA. He succeeded **A. D. R. Fraser,** president, **Rome Cable Corp.,** Rome, N.Y.

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**Herbert B. Bassett,** president, **The Acme Wire Co.,** New Haven, Conn., and **David E. Allen,** New York, N. Y., Vice President in Charge of Sales, **Anaconda Wire and Cable Co.,** were elected vice chairmen of the Section.

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**The** three newly elected officers, along with Mr. Fraser, were also named members of the Section's Advisory Committee. This Committee also functions as the Executive Committee of the Section. Members, in addition to Messrs. Ilsley, Bassett, Allen and Fraser, are:

## Advisory Committee

**Howard T. Brinton,** New York, President, **Phelps Dodge Copper Products Corp.; Herbert W. Clough,** Chicago, Vice President, **Belden Manufacturing Co.; Clarence W. Higbee,** New York, Manager, Electrical Wire and Cable Department, **U. S. Rubber Co.; J. R. MacDonald,** New York, Chairman of the Board, **General Cable Corp.; Everett Morss,** Cambridge, Mass., President and Treasurer, **Simplex Wire and Cable Co; A. F. Sheldon,** Phillipsdale, President, **Kennecott Wire and Cable Co.; William E. Sprackling,** Hastings-on-Hudson, Executive Vice President, **Anaconda Wire and Cable Co.; A. F. Metz,** Passaic, N.J., Chairman of the Board, **The Okonite Co.; R. G. Boyd,** Chicago, Assistant General Sales Manager,

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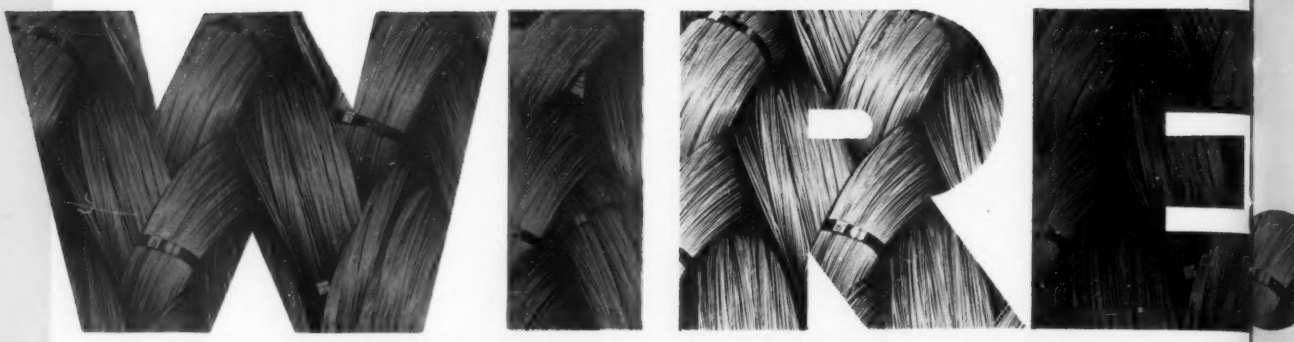
# *if you use*

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Drapery Pin Wire
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Glass Netting Wire
Hairpin Wire
Hook and Eye Wire
Mattress Wire
Picture Cord Wire
Picker Tooth Wire
Pin Ticket Wire
Pin Wire
Ring Traveler Wire
Spiral Binding Wire
Stapling Wire
Stapling Wire for Preformed Staples
Stone Wire
Weaving Wire
Weaving Wire for Fly Screen Cloth
Wissco Iron Wire

**HIGH CARBON FINE AND SPECIALTY WIRE**
Aircraft Cord Wire
Armor Wire
Belt Hook Wire
Bobbin Ring Wire
Brush Wire (Tempered and Untempered)
Brush Wire (High Strain)
Chrome Vanadium Spring Wire
Core Wire (Aluminum Cable Steel Reinforced)
Curtain Spring Wire
Flexible Shaft Wire
"Gamma" Spring Wire (Upholstery Spring Wire)
Zig Zag Wire
No-Sag Wire
Hat Wire
Heddle Wire
Hose Reinforcement Wire
Hose Wire, Mechanical
Hose Wire, Vacuum and Defroster
Rope Wire
Signal Corps Wire
Spoke Wire
Hard Drawn Spring Wire
Oil Tempered Wire
Spheroidized or Annealed Spring Wire
Tire Bead Wire
Valve Spring Wire

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Brush Handle Wire
"Cal-Tie" Wire
Can Key Wire
Case Hardened Ball Wire
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Garment Hanger Wire
Hay Baling Wire (Coiled)
Lingo Wire
Lintel Wire
Loop Wire
Merchant Quality Wire
Pail Bail Wire
Rivet Wire
Stapling Wire
Strand Wire
Tying Wire
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Heading, Forging or Roll Threading Quality Wire
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**THE COLORADO FUEL AND IRON CORPORATION**—Albuquerque • Amarillo • Billings • Boise • Butte • Casper • Denver
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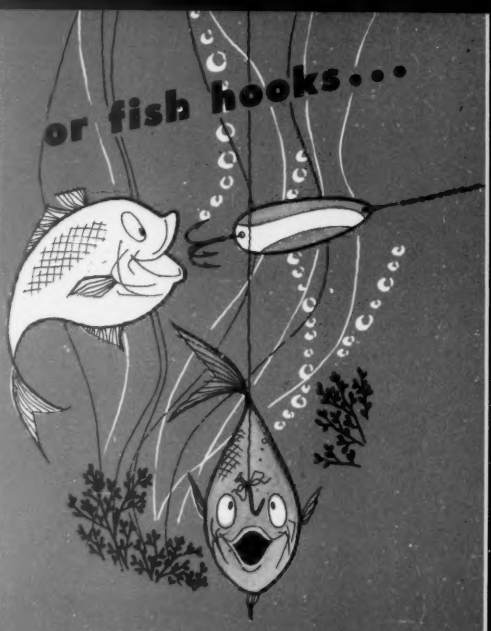
for upholsterers' hog rings...



or fish hooks...

or florists' frogs...

or bee hives...

or pail bails...

or can keys...

or any of countless other products that require wire...

it'll pay you to investigate

**CF&I-WICKWIRE**

as a source for your wire needs

# Ansonia Wire and Cable's New Plant Dedicated

**Late** in November the new domicile of **The Ansonia Wire and Cable Company** at Ashton, Rhode Island, was formally dedicated and a plaque was unveiled bearing the inscription "Dedicated November 26, 1956, A.D., by the Honorable **Dennis J. Roberts,** Governor of the State of Rhode Island."

★ ★ ★

**Construction** of the new plant had been started almost a year earlier, with the transfer of machinery from the old plant begun last summer before the roof of the new structure, which covers three acres of ground, was entirely enclosed. The building is the first of its type to be built in the state, embodying reinforced concrete beams and tilt slabs for outside walls, fabricated and raised into position at the site. The slabs measured 22x24 feet and weighed 19 tons each.

★ ★ ★

**Thomas A. Monahan,** Executive Director of the Rhode Island Development Council, served as Master of Ceremonies, introducing first Governor Roberts, who made the dedicating speech, graciously inviting **Mrs. Alden P. Lunt,** wife of the Company president, to unveil the plaque. The Governor extended a warm welcome to The Ansonia Wire and Cable Company on behalf of the State of Rhode Island and expressed his hope that it would thrive and expand under the favorable conditions that have been set up to make the state attractive to industry.

★ ★ ★

**Other** speakers included **W. Allen Traver,** President of the Business Development Company; **Raymond H. Trott,** President of The New England Council; **Lester H. Knapp,** President of the Pawtucket Business Chamber; **Robert B. Butler,** President of the Town Council, Cumberland, R. I.; **and** last, but not least, **Alden P. Lunt,** Ansonia's vigorous young chief executive.

★ ★ ★

**All** of the organizations represented had had a part in working out plans to make it attractive to the company to locate in Ashton, in financing the move and in erecting the building to Ansonia's specifications. These organizations had worked out a "package deal" through which land was acquired, financing arranged, the plant constructed, utilities provided and a long-term lease effected.

★ ★ ★

**Mr. Lunt** responded to the words of greeting and welcome and paid tribute to the speakers and their respective organizations for their whole-hearted cooperation, stating that the building was a monument to the people of the State of Rhode Island under Governor Roberts. He said that the Company, after 60 years of existence in the heart of Ansonia, Conn., where it had outgrown its facilities, had been provided with a fine new home and associations that assured its continued growth. Mr. Lunt said no other northeastern state, to his knowledge, could match the promises to new industry with deeds and actions nearly as well as Rhode Island is doing. He closed with his pledge that he and his associates would not break faith with those men and agencies who had cooperated so well with them to bring about the move.

★ ★ ★

**Following** the dedication ceremonies conducted tours in small groups were made through the plant, first of the invited distinguished guests and then of their employees and their families. Among the guests, besides government and agency officials, were representatives of other companies active in the production of electric wire and cable from the Providence area, which, it had been pointed out, contained the greatest concentration of similar industries of any section of the country, all within a 10-mile radius of Providence.

★ ★ ★

**The** new building, incidentally, stands on a 17-acre plot of ground that affords ample opportunity for expansion should occasion for it arise. Needless to say, while the plant is laid out for a smooth straight line of flow of work, there is still room for some additional equipment under the present roof.

★ ★ ★

**After** the tour the guests were

Ansonia Wire and Cable's new plant covers three acres of ground. Walls were raised in 19-ton sections by the tilt-slab process. * * * * *

Left to right: Robert B. Butler, President, Cumberland Town Council; Alden P. Lunt, Ansonia's President; W. Allen Traver, President of the Business Development Co. of R. I.; and Lester H. Knapp, President, Pawtucket Business Chamber. * * * * * * * * * * *

Guests listening to Governor Roberts at the dedication ceremony. Audience included plant employes. * * * * * * * * * *

Victor Siegfried, Ansonia's Chief Engineer, showing a group of guests one type of insulated wires made by the company. * * * * * *

whisked to the Sheraton-Biltmore Hotel in a police guided motorcade for a reception at which all were able to meet the members of the Board of Directors, as well as other guests.

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**The** principal products of the Company are electric cables for station controls, fire alarm systems, traffic signals, inside telephone systems, telephone exchanges, telephone toll systems, power conductors, submarine communication systems, and radio and radar wiring. These are all sold under the trade name "Ankoseal®". The company buys bare copper wire and from there on performs all operations from the compounding of the plastics to the manufacture of finished cables.

★ ★ ★

**Ansonia** Wire and Cable is to be congratulated on its fine new home and its excellent location, which is just nine miles north of the thriving City of Providence. Its dedication ceremonies were dignified and impressive, yet gala in spirit, with a genuinely sincere enthusiasm for the open-arms policy of the Rhode Island commonwealth underscoring every facet of the affair.


*Next Spring — in May — will be held*

**THE CANADIAN REGIONAL MEETING**

**May 13-14, 1957 — Royal Connaught Hotel — Hamilton, Ontario, Canada**

The Program Committee, headed by Allan B. Dove, Research Supervisor, Steel Company of Canada Ltd., has announced that there will be papers of general interest, as well as technical papers on ferrous and non-ferrous topics.

Plans have been made for plant visits to the Parkdale Works of The Steel Company of Canada in Hamilton and the Federal Wire and Cable Company at Guelph, Ontario.

***All wire men are cordially invited to be present at this fine Regional Meeting.***

**THE WIRE ASSOCIATION**

**RICHARD E. BROWN, *Executive Secretary***

**453 MAIN STREET** • **STAMFORD, CONN.**

# Government Wire Production Information

## Porosity Detection in Plated Coatings

**Pores** and other flaws seriously impair the quality of industrially produced electroplated coatings, diminishing their effectiveness as protective coatings for metals. Until now it has been difficult to estimate the relative merits of electrodeposits since no method of determining the gravity of defects was available. Recently, however, the **National Bureau of Standards** has developed a non-destructive procedure for ascertaining both the size and position of pores.[1] The method involves photographing an electroplated specimen exposed to radiation.

★ ★ ★

**In** earlier research, a technique applicable to plated coatings that have been removed from the basis metal was developed by the Bureau.[2] However, the likelihood of stripped-coating porosity differing from adherent-coating porosity led to further investigation of the problem. The present work was carried out for the American Electroplaters' Society by **F. Ogburn** of the Bureau staff and **Margaret Hilkert** of the Society's research fellowship at the Bureau.

★ ★ ★

**In** determining the location and size of pores, the specimen, a flat sheet of plated metals a few thousandths of an inch thick, is placed on a photographic film with the coating against the film emulsion. The assembly is held in a cardboard cassette, and the basis-metal side of the specimen is exposed to X-rays or radiation from a radioactive material. To insure good contrast, the X-radiation used must be soft. This requirement of low-energy X-rays limits the thickness of the basis material to several thousandths of an inch, since thicker metal absorbs too much of the X-ray beam and requires too long an exposure time. Radioactive iron, nickel, or cobalt held against the plated specimen in a cassette are also adequate sources of radiation.

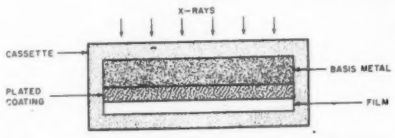


**Figure 1—Diagram illustrating the method developed at the National Bureau of Standards for investigating the porosity of electroplated coatings. The plated specimen is held against an X-ray film in a cassette with the plated coating against the emulsion of the film. The basis metal side of the assembly is exposed to X-rays or radiations from a radioactive material.** * * *

★ ★ ★

**After** a suitable exposure time the film is removed and developed, satisfactory radiographs result from a 3- or 4-min exposure to an X-ray machine, and from a 24-hr exposure to 1$\mu$c of radioactivity. Wherever a pore existed in the

MICROMETER PRECISION — MICRO-WELD — TRADE MARK REGISTERED

**MODELS J-3-S and J-4-S AUTOMATIC MICRO-WELD BUTT WELDERS**

These welders are used for welding high and low carbon STEEL, and STEEL ALLOY wire, ranging in size from .020" to .160" diameter. All operations on these units, which include the clamping of the wire being welded, contacting the welding switch, and upsetting the weld, are made by a single downward stroke of the foot pedal. Welders for high carbon steel wire are equipped with the exclusive MICRO-WELD Dial indicating annealing device to facilitate the annealing operation of high carbon wire.

Standard equipment with these units include annealing dies, filing vise, light extension cord, and mounting on a 4-wheel truck. Special units can be furnished for crane mounting.

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coating, a black spot appears on the developed film. A fine-grain industrial X-ray film gives the most readable radiograph.

★ ★ ★

**This** radiographic method detects pits, voids, and inclusions in the coating to the order of 0.001 in. in diameter. Discontinuities in the basis metal may also be determined by radiographing the metal before plating.

★ ★ ★

[1] The nature, cause and effect of porosity in electrodeposits, II. Radiographic Detection of Porosity in Electrodeposits, by F. Ogburn and M. Hilkert. Annual Tech. Proc. Amer. Electroplaters' Soc., p. 256 (1956).
[2] The nature, cause, and effect of the porosity in electrodeposits, by F. Ogburn and A. Benderly, Plating 41, 168 (1954).

## Developments in Heat Treating Wire in 1956

By Carl L. Ipsen
Executive Vice President, Industrial Heating Equipment Association

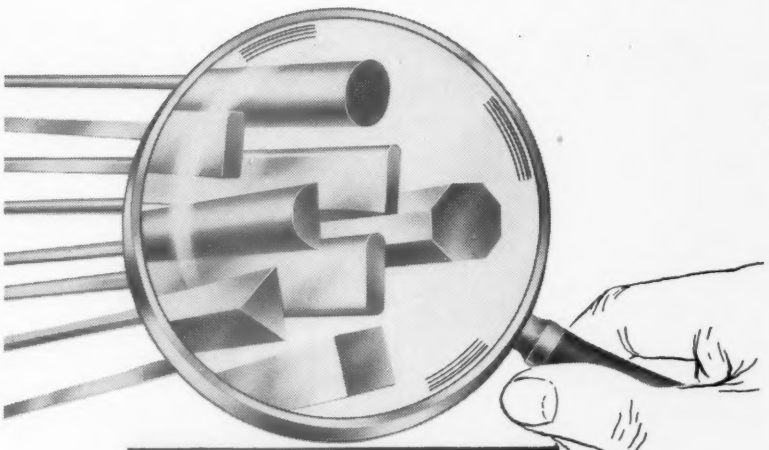
**The** year 1956 was a banner year for the heat treating industry, both in sales and technical advances. Although the final account of orders received has not been tabulated as yet, the industry will unquestionably top its previous peacetime record year, 1955, by at least 20 per cent.

★ ★ ★

A forecast by members of the **Industrial Heating Equipment Association** predicts that business in 1957 will be approximately at the 1956 level. Unquestionably, one of the great reasons for this upsurge of interest in heat treating equipment (the post Korean War years show that sales of industrial heating equipment are up 265 per cent over post World War II years as against only 60 per cent for the economy as a whole) have been the opportunities for cost cutting and quality improvement which modern industrial heating equipment offers.

★ ★ ★

**Automation,** with its great advantages in labor saving and better quality control, has been a key factor. Without doubt, the advantages offered by modern types of heat treating equipment render much equipment, which one might suppose to have many years of useful life in it, obsolete.



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Cut Costs . . .
Improve Product Performance

Alloy Special Wire Shapes reduce costly machining time and cut metal waste. No need to start with round wire and machine half of it away to get the shape you want. We can supply you with Stainless Steel and Nickel Alloy wire in just about any special shape you may require.

Drawn Alloy Wire Shapes provide other advantages in addition to reduced costs. Product quality and performance are also improved. The drawn wire insures uniformity of cross-section and a smooth, flaw-free surface.

Send today for information on Alloy Special Wire Shapes — and for our Nickel Alloy and Stainless Steel Properties Charts . . .

Write to Alloy Metal Wire Division, H. K. Porter Company, Inc., Prospect Park, Pa.

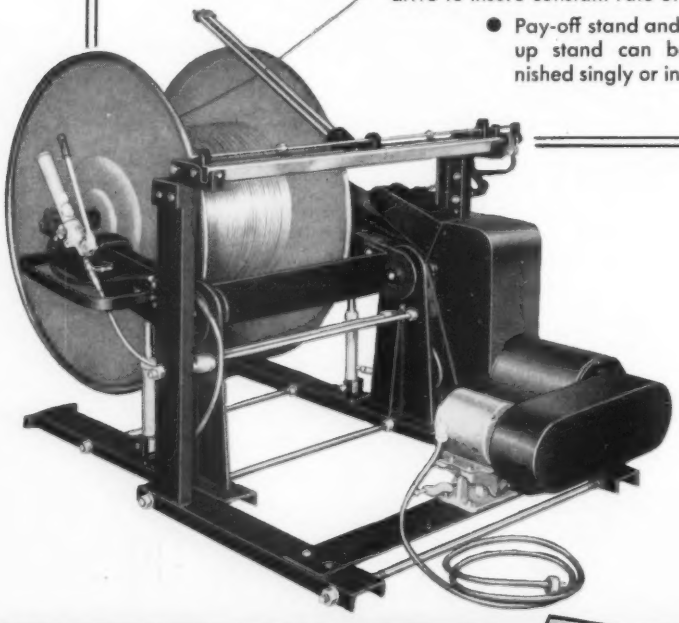
HKP ALLOY METAL WIRE DIVISION
H. K. PORTER COMPANY, INC.

# NEW WARDWELLIAN®

## PAY-OFF STAND and WINDUP STAND

**For Delivering Wire and Cable to Various Types of Production Machines and Winding Product on Reels**

- Pay-off stand and windup stand will accommodate reels from 30" to 48" in diameter. Maximum weight of full reel 5000 pounds.
- Stands to accommodate reels of greater diameter can be furnished upon request at additional cost.
- Reels raised and lowered hydraulically on both pay-off stand and windup stand.
- Pay-off stand equipped with adjustable friction-control for desired tension of delivery.
- Windup stand equipped with adjustable traverse mechanism.
- Windup stand operated by individual motor through fluid-drive to insure constant rate of draft.
- Pay-off stand and windup stand can be furnished singly or in pairs.



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JAMES MACKIE & SONS, LTD., BELFAST, IRELAND


A typical example of the technical improvements in the wire field is reported by one I.H.E.A. member company who tells us that several fine wire, intermediate wire, and medium wire enameling machines were installed in one plant to provide enough added capacity to produce 400 miles of enameled wire per hour.

★ ★ ★

**Member** companies report a general increase in demand for all types of wire products. In addition, they report a "tremendous increase" in the requirements for material for the fastener trade — nuts, bolts, and screws. "The wide acceptance of high-strength bolts for structural steel assembly and the increased use of alloy materials has increased the demand for this type of material enormously," one company wrote.

★ ★ ★

**This** has led to the installation of a large number of furnaces for spheroidizing rod and wire. Additionally, one company reports it has been the impetus for it to design a large rod coil furnace which will handle three stems of rod at one charge.

★ ★ ★

A number of interesting installations have been reported.

★ ★ ★

**The** company making this furnace reports that it can produce up to three times as much as three small furnaces with a decided saving in cost. By the use of high-convection heat transfer, the product is also more uniform, it reports.

★ ★ ★

**In** a survey among I.H.E.A. member companies, four trends are seen in the heat treatment of wire products: (1) greater use of automation, (2) increasing use of vacuum furnaces for melting and heat treating, (3) more precise instruments for automatic carbon potential control and (4) increased use of protective atmospheres.

* One company reports numerous installations of large furnaces to heat treat coil rod material.

* Several interesting installations have been made for annealing 30-foot-long merchant bars that are being prepared for the screw machine trade, where lamellar annealing is required rather than spheroidizing. These furnaces are equipped for carbon restoration, so that the amount of centereless grinding, usually so necessary for this type of material, has been reduced due to the elimination of decarburized areas on the material. In addition to labor saving, this process indicates a considerable saving in the size of the bar being processed, due to the elimination or sharp reduction of grinding.

* Large circular furnaces in sizes up to 114 inches in diameter to accommodate the newer 1,200-pound bundles of rod material, now being processed in rod mills, were installed. These coils have reached an outside diameter of 54 inches. To accommodate three stems of this size, the 114-inch size is necessary. Piling heights in this class of equipment have been largely used at 84 inches and 94 inches. One such new large installation of this kind of furnace has been made at 108 inches for the piling height of rod material. This increases the load by 20 per cent. In effect, it gives the extra material a "free ride" and no longer cycle will be required for the additional loading. Furnaces of this type are built at a five millionth BTU per hour input, which is more than adequate. In this type of furnace, the convection system is powered with a 25-horsepower motor and the charge is so designed to induce a secondary circulation down through the center of the supporting spiders. This, in effect, doubles the volume of the gases flowing.

* A new type of loading and stripping machine has been developed so that a complete stack of coils can be loaded on the spiders at one time or removed at one time. The pattern installation of this unit has been completed, the company making it reports, and a number of machines of this nature are under contract.

## New Catalog Issued by National Electric Products

**Latest** wire and cable catalog prepared by **National Electric Products Corp.**, Pittsburgh, discusses the composition, tested "in use" properties and suggested applications of "Type RR Rubber Insulated-Neoprene Sheathed Non-Metallic Cables."

★ ★ ★

**The** illustrated reference piece provides 40 pages of helpful information for electrical engineers and contractors, plant engineers, maintenance superintendents, utility officials, public works engineers and others who specify for electrical construction.

...and here's why!

Now you can enjoy lower freight charges and greater protection against damage with the new, lighter weight NYECO steel reels. They cost so little more, last 12 times longer than wooden reels, require minimum maintenance. Rugged weatherproof, splinter-proof, warp-proof protection protects costly cable against damage due to dropping, bouncing, rough handling.

**Think it over** and you'll agree that it doesn't pay to risk an investment of thousands . . . and your reputation . . . on inferior reels.

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**finishes for wire and cable constructions**

*Formulated by specialists* . . . backed by over 30 years of experience in working with wire manufacturers. Nine standard finishes are listed below. Many more are available. Consider how you can use them or how we can help you to select the exact finish for your particular problem.

NL 7147—NELCO Cable Coating
General radio hook-up and push-back wire constructions

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Similar to NL 7147 but with fungicidal agent

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Meets requirements of automatic primary wire manufacturers

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A penetrating bonding coating for nylon braided constructions

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For switchboard hook-up wire constructions

R 1407—NELCO Nylon Cable Coating
For wire constructions meeting MIL-W-5086

R 2055—NELCO Anti-Fray Saturant
Prevents fraying of glass-braided wire constructions

R 4004—NELCO Flame Retardant Saturant
Good flame resistance, no color change

R 4026—NELCO High Temperature Resistant Cable Coating
Fluorinated coating for wire constructions meeting MIL-W-8777

*Write for our Data Sheets giving complete information on these finishes.*

**Chemical Products** CP CORPORATION

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**Contained** in the bulletin is evidence of the "weathering" properties of National's Type RR rubber insulated-neoprene sheathed, non-metallic cables when exposed to aggressive sun, water and soil conditions.

★ ★ ★

**Individual** treatment is accorded the various types of cable: Type USE 600 volt underground service cables, type RH-RW 600 volt duct cables, type RHW 600 volt duct cables, Neocozone Flexlay high voltage cable and station control cables.

★ ★ ★

**Appropriate** charts provide data on size, strand construction, insulation sheathing, outer diameter and shipping weights. Appropriate data on current carrying capacities is provided.

★ ★ ★

**The** catalog is available from the National Electric Products Corp., Gateway Center, Pittsburgh 22, Pa.

### Reference Folder on Plastics

**To** help designers, engineers and fabricators choose the right plastic for any job, a revised 1957 edition of the "Condensed Reference File of Bakelite Plastics" has been published by **Bakelite Company,** a Division of Union Carbide and Carbon Corp. Bakelite supplies six of the major types of plastic currently used by industry in more than 50 different forms.

★ ★ ★

**Designed** as a ready reference for industry, the 16-page booklet boils down into easily understood terms. Distinguishing characteristics, appropriate fabricating techniques, and major fields of application are clearly defined for each different group of plastics in a terse, fact-packed style. These groups include polyethylenes, vinyls, phenolics, styrenes, epoxies and polyesters supplied by Bakelite Company for industrial use. More than 80 photographs and sketches illustrate some typical and proper uses of these materials.

**Handy** charts indicate the wide variety of plastics Bakelite sells by major methods of fabrication, such as Bonding, Laminating, Molding, Extrusion, Calendering, Film and Sheeting, Surface Coatings and Flexible Packaging materials. These are directly related to the major fields of application so that an engineer, designer or fabricator can find the materials best fitted for his use in the initial stages of product planning.

★ ★ ★

**Copies** of the "1957 Condensed Reference File" are made available to business firms on request. They may be obtained by writing to Bakelite Co., a Division of Union Carbide and Carbon Corp., 30 East 42 Street, New York 17, N. Y.

### Announces New Facilities for Flattening and Tinning Alloy Wire

**Little Falls Alloys, Inc.,** 189 Caldwell Avenue, Paterson, N. J., manufacturers of non-ferrous wire in a wide range of forms, sizes and tempers for special applications, announce the recent addition of facilities for the flattening and tinning of alloy wire.

★ ★ ★

**The** flat wire is available in Beryllium copper, phosphor bronze, brass and other alloys. Supplied in 20 to 30 pound rolls, it is ideal for feeding automatic stamping and forming machines.

★ ★ ★

**Because** it is flattened round wire, the edges of the wire are smooth and round. This eliminates small nicks, called "stress-raisers," which weaken the wire. Rounded edges also provide easier handling and less finishing operations.

★ ★ ★

**The** flat wire is tinned by the hot-dip process after flattening. This eliminates the expensive and often impractical operation of tinning after forming (for solderability).

★ ★ ★

**It** is expected that the flat wire will find a multitude of applications in subminiature instrument and control manufacturing, in the transistor and vacuum tube indus-


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ONE NAME STANDS OUT!

Once you've tried them, it's easy to see why *Apco Mossberg* steel reels, spools and bobbins have won world-wide recognition for quality construction . . . unbeatable on-the-job performance.

For over fifty years, *Apco Mossberg* has been supplying manufacturers of wire and wire products with reels engineered to fit their exact requirements in size, balance and trueness. They can do the same for you, too.

Look for the *Apco Mossberg* name the next time you consult your buyer's guide or product register. Our engineering and service departments will gladly submit recommendations based on your needs at no obligation. Write, wire or phone Attleboro 1-0340 collect today.

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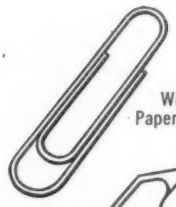
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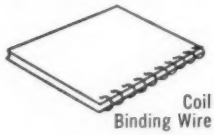
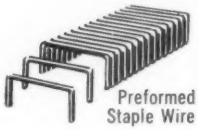
Thousands of wire applications in over a half century—involving virtually every kind of a wire problem—that's the experience and background we offer you in solving *your* special wire problems. We can supply wire from almost the size of a human hair, through 9/16" diameter for metal fasteners . . . round wire or wire in special shapes, practically any size, temper, finish and analysis in low carbon and medium low carbon steels. We may have a valuable case history that parallels your own special problem. Fill out and return the coupon for full details of Continental's Wire Service. We are eager to work with you.


Coil Binding Wire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Florist Wire

Wire Bales for Buckets, Pails, etc.

Wire for Toy Wheels

Standard and Special Wire Shapes

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Gentlemen: Please give us without obligation complete details of your special wire service.

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**PRODUCERS OF:** Manufacturer's Wire in many sizes, shapes, tempers, and finishes, including Galvanized, KOKOTE, Flame-Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright, and special wire. ALSO Coated and Uncoated Steel Sheets, Nails, Continental Chain Link Fence, and other products.


tries, and for other uses in electronics such as high power, high frequency inductances and radio frequency leads.

★ ★ ★

**Complete** information without obligation may be obtained by writing to Little Falls Alloys, Inc., at the above address.

### Armco Folder Covering Stainless Bar and Wire

A new illustrated folder from **Armco Steel Corporation** describes various standard and special grades of stainless steel bar and wire. Among the special grades are 17-4, PH, 17-7 PH, ELC and stabilized alloys, free machining stainless, 17-14 Cu Mo, 22-4-9 stainless and 17-10 P stainless steel. All are available from the mill and from Armco distributors and technical assistance is offered. Write to the company's Product Information Service for copies, mentioning P. O. 2856.

### Bulletin on Solderless Wiring Devices

**Terminals** and connectors may be crimped to wire extremities with more speed, greater ease and quality than ever before with new solderless wiring devices developed by the **Electric Terminals Corp.**, 2019 Center St., Cleveland 13, Ohio.

★ ★ ★

**Crimping** time is reduced and more positive, permanent connections can be made because the new wiring devices provide an improved target area for crimping tool operation. Terminals and connector barrels are made a full one-quarter inch in length to provide ample room for the nose of the crimping tool. This extra space ends fumbling on the production line, reduces rejects and permits workers with little or no experience to make permanent solderless dependable connections.

★ ★ ★

**All** terminals and connectors are rated beyond the current carrying capacity of the wires used, exceeding U.L., C.S.A. and US Government specifications and standards when properly applied. The bulletin is available upon request.

# Outstanding Personalities of the Wire Industry

### Promoted by G. E.

**J. S. Gillespie,** acting manager of the industrial diamond project for **General Electric's Metallurgical Products Dept.,** Detroit, has been named manager of engineering, **K. R. Beardslee,** department general manager has announced.

★ ★ ★

**In** addition to his new duties, he will continue as acting manager of the diamond project. He joined G. E. in 1936 as an engineer for the then Carboloy Department. Before becoming acting manager of the diamond project, he was manager of product planning.

### ACCO Appoints Plant Manager

**Robert B. Kramer** has been appointed to the position of Plant Manager, **Page Steel and Wire Division, American Chain & Cable Company, Inc.,** Monessen, Pa., according to an announcement by **Harvey W. Seymour,** General Manager.

**He** entered Page's employ as a metallurgist in 1940 and served in supervisory capacities in several departments before his promotion to Wire Mill Superintendent in

Robert B. Kramer

1951. Early in 1956, he was appointed Assistant Plant Manager. Mr. Kramer is a graduate of Carnegie Institute of Technology, class of 1938, and holds a B. S. degree in Metallurgical Engineering.

### Bakelite Appointments

**Three** appointments to new responsibilities have been announced by the **Bakelite Co.,** Plastics Div. of Union Carbide and Carbon Co.

★ ★ ★

**J. E. Brister** General Manager—Polystyrene. He joined Bakelite Company in 1933 at Bound Brook, N. J. He received a B. S. in mechanical engineering from Stevens Institute of Technology. Mr. Brister was formerly Manager, Molding and Extrusion Department.

★ ★ ★

**R. D. Glenn** is now General Manager — Vinyls. He joined Union Carbide in 1934 as chemical engineer at Carbide and Carbon Chemicals in South Charleston,

Glader—Years of Proven Performance
GLADER NAIL MACHINES
55 YEARS of experience meeting the exacting demands of nail making.
The machine with a record of steady dependable service.
Wm. GLADER MACHINE WORKS
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CHICAGO 7, ILLINOIS

W. Va. He received a B. S. in chemical engineering in 1933 and an M. S. in 1934 from Massachusetts Institute of Technology. He was formerly Assistant Works Manager, Carbide and Carbon Chemicals.

★ ★ ★

**Dr. A. W. Downes** has become General Manager—New Resins and Compounds. He joined Union Carbide in April, 1933 as a chemist at Carbide and Carbon Chemicals Co., South Charleston, W. Va. He received an A. B. in chemistry from Oberlin College in 1929, an M. A. in chemistry from Western Reserve in 1930, and a Ph.D. in chemistry from the University of Wisconsin in 1932. Dr. Downes was formerly Associate Director of Development.

## Important Changes at A.S.&W.

**Van H. Leichliter** has been elected President, succeeding **Walter F. Munford, Harry L. Jenter** has been made Vice President-Operations. **Walter L. Longnecker** has been promoted to Cleveland District Manager of Operations and **James J. Dalton** has been appointed General Superintendent of the Cuyahoga Works, according to announcements made by the **American Steel and Wire Division of the United States Steel Corporation.**

★ ★ ★

**Mr. Jenter** joined the Wire Division's Trenton Works as a draftsman in 1917 and for the next few years alternately worked for the company and attended college. In 1926 he was graduated from Syracuse University with a degree in mechanical engineering. He then transferred to the Cleveland office as a student apprentice and in 1928 was made assistant foreman at the Cleveland Newburgh Wire Works.

★ ★ ★

In 1932 he was transferred to the Cleveland Cuyahoga Works Cold Roll Strip Dept. and in 1934 was made a general foreman. He became assistant superintendent of the Works in 1935 and general superintendent in 1939. In 1942 he transferred to the headquarters office as assistant to the vice president of operations. He resumed his post as general superintendent of Cuyahoga Works a year later. In 1950 he became chief engineer, in 1952, assistant manager of operations Cleveland District, and since 1953 has served in the capacity of manager of operations Cleveland District.

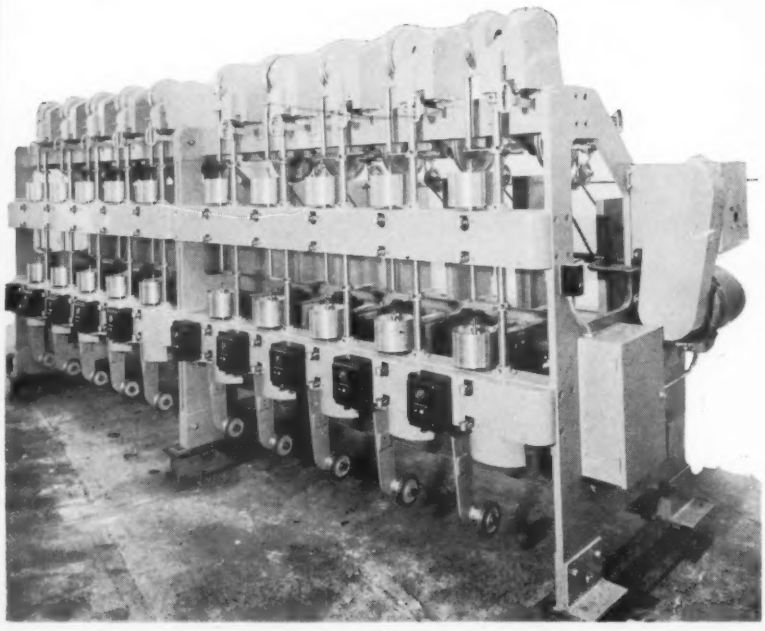
★ ★ ★

**Mr. Longnecker's** experience with American Steel & Wire dates back to June, 1939, when he started as a technical apprentice at the Donora (Pa.) Steel & Wire Works. He progressed through the ranks and was a general foreman in the rod mills at the plant at the time of his transfer to the Cleveland headquarters office in June, 1945, as division metallurgist, rod mills. Appointed division superintendent of hot mills at Cuyahoga Works in March, 1946, he became general superintendent of that plant December 1, 1951.

★ ★ ★

**Mr. Dalton** began his steel career in 1944 as senior procedure analyst


**2D-10-MBB INSULATION WINDING MACHINE No. 1129**



APPLIES DOUBLE COVER TO 10 LINES OF WIRE SIMULTANEOUSLY. NOMINAL WIRE RANGE #15 TO #25 B&S GAUGE (.057" TO .018" or 1.450MM TO .455MM). STANDARD CAPSTANS 8" DIAMETER. SUPPLY WIRE LETOFFS AND TAKE-UPS ARE AT REAR OF MACHINE NOT SHOWN. MACHINE CAN BE ARRANGED SPECIAL WITH 12" DIAMETER CAPSTANS FOR HEAVIER WIRES.

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"American" AIM INSULATING MACHINERY COMPANY

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FAIRHILL AND HUNTINGDON STREETS

PHILADELPHIA 33 PENNSYLVANIA U.S.A.

in the Wire Division's headquarters in the Rockefeller Building. In June, 1945—he was advanced to assistant division supervisor of production control in the Cold Roll Dept. at Cuyahoga Works, and three years later he was made division supervisor of production planning. In January 1953 he was advanced to the assistant division superintendent of the same department, and six months later he was appointed division superintendent of cold roll, a post he has held until his present promotion.

★ ★ ★

**Mr. Leichliter,** who was made Vice President — Operations in 1953, was born in Mount Braddock, Pa., and was first employed by A.S.&W. in Metallurgical work in 1930. He was moved to the Vice President's office in Cleveland as a metallurgist in 1934 and the following year became the Cleveland District Metallurgist. In 1935 he went to the Newburgh works as Assistant Superintendent and in 1939 became Superintendent of the Cuyahoga Works Wire Mills, two years later being transferred to Worcester to take a similar job at the South Works. In 1944 he became Division Superintendent and in 1945 was appointed General Superintendent. He went to Cleveland in 1950 as Assistant Vice President —Operations and was appointed to the office just vacated in 1953. Mr. Leichliter's well-known abilities have now taken him to the top of the ladder in A.S.&W.

★ ★ ★

A little earlier it was also announced that **James E. Brown** had been named Vice President and General Manager of A.S.&W.'s Cyclone Fence Division at Waukegan. He joined the company in 1930 and has worked in various capacities in different company plants and had been General Superintendent at Waukegan since 1950.

★ ★ ★

**Roy E. Pinniger,** who had been Vice President and General Manager of Cyclone Fence Division, has been moved to Cleveland as Assistant to the President. He is a veteran of 35 years in the chain-link and related products field.

**A. H. Wardwell,** formerly Director of Raw Materials, has been made Assistant to the Vice President and is succeeded in his previous job by **Jacob W. Cox.**

## Harper Appoints New Purchasing Agent

**The** appointment of **Roy Hawkes** as Purchasing Agent has been announced by **Harper Electric Furnace Corp.,** Buffalo manufacturer of high temperature electric furnaces and kilns for the metal-working and ceramic industries.

★ ★ ★

A business administration graduate of Niagara University, he has had 17 years of industrial purchasing experience. He has been associated with various divisions of Union Carbide and Carbon Corporation as purchasing agent, office manager and assistant superintendent; most recently he served as purchasing agent for Tenney Engineering, Inc., of Union, New Jersey.


CAMDEN WIRE CO., INC.

*Wire Fabricators*

**Producers of Quality Fine Wire Copper Conductors**

**EXTRA FLEXIBLE CONDUCTOR STRANDED OR BRAIDED**

**MULTIPLE ENDS OF SIZES .008 to .002**

**BARE • TIN or LEAD COATED • SILVER PLATED**

**Special Heavy Tinned Conductors for Hook-up Wire**

**40 MASONIC AVENUE** • **CAMDEN, NEW YORK**

### Elgin Abrasives Unit Appoints Sales Engineer

**The** Abrasives Division of **Elgin National Watch Company** announces the appointment of **Roy Zahn** as sales engineer in six states of the New England region.

★ ★ ★

**He** will handle sales of the company's line of diamond compound, carbide rotary tools and Elgiloy, a non-corrosive spring alloy, in Massachusetts, Connecticut, Rhode Island, Vermont, New Hampshire and Maine, it was announced by **W. H. Baudouine,** division sales manager, operating from offices at 119 Ann Street, Hartford, Conn.

### RB&W Sales Appointments

**Willard Dunham** and **Henry Steers** have been appointed to the newly created sales posts of assistant Western sales managers, it was announced by **Harry O. McCully,** vice president in charge of sales, **Russell, Burdsall & Ward Bolt and Nut Company.** Both posts are in the Chicago office.

★ ★ ★

**David Spoehr** will take over sales duties formerly performed by Mr. Steers in the St. Louis territory.

★ ★ ★

**Mr. Dunham** was formerly manager, Western distributor sales. Associated with the fastener industry for 35 years, he has been employed in the Chicago area for the past 12 years.

★ ★ ★

**Mr. Steers** has worked as salesman in the St. Louis area since 1951 and has been with the company for 14 years.

★ ★ ★

**Mr. Spoehr** has worked in the Chicago area as sales representative since 1953.

### Universal-Cyclops Transfers Bruckart to Special Sales

**William L. Bruckart,** formerly a Development Engineer in the Technical Department, has been transferred to the Special Products Sales Department by **Universal-Cyclops Steel Corp.,** Bridgeville, Pa. Mr. Bruckart's activities in the development of molybdenum metal and refractory alloys will be integrated with other special product sales development.

★ ★ ★

**Mr.** Bruckart is graduated from the University of Kentucky and holds a Master of Science degree from Ohio State University. He was formerly with Battelle Memorial Institute.

### Cleveland Crane Names Superintendent

**William J. Ryan** has been appointed Shop Superintendent of **The Cleveland Crane & Engineering Co.,** Wickliffe, Ohio.

★ ★ ★

**Mr. Ryan** has been with the company for seven years, during which time he has served as office manager, personnel manager, and assistant to the general manager.

★ ★ ★

**The** Cleveland Crane & Engineering Co. manufacture heavy overhead traveling cranes, Cleveland Tramrail overhead materials handling equipment, heavy metal-forming presses, press brakes and metal-cutting shears.


*Another Development ... by Hubbard!*

**PLYWOOD MARRIES STEEL**

**FOR BETTER SHOP REELS**

RESULTING IN

1 GREATER IMPACT STRENGTH

2 LOWER MAINTENANCE COSTS

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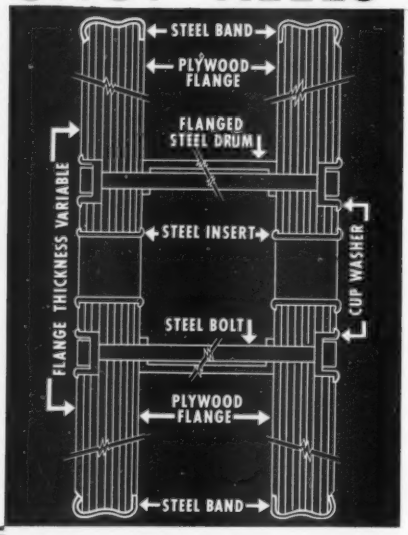
4 CAN BE SUBMERGED IN WATER

5 WIDE RANGE OF SIZES




**LOWER INITIAL COST**

FOR DETAILS CONTACT

**HUBBARD SPOOL CO.**

GARRETT, INDIANA

## Rockbestos Appoints New England Representative

**Rockbestos Products Corp.**, wire and cable manufacturers of New Haven, Conn., announce the appointment of **Joseph L. Feinberg** as their New England Sales Representative.

★ ★ ★

A graduate of the United States Merchant Marine Academy, Kings Point, New York, he is an electrical engineer. He has taken graduate courses in electronics development at New York University.

## To Manage Furnace Division For Rockwell

**Leonard J. Edwards** has been appointed Manager of the Furnace and Oven Division of **W. S. Rockwell Co.**, Fairfield, Conn. Mr. Edwards had previously been Vice-

Leonard J. Edwards

President of **C. I. Hayes, Inc.**, Providence, R. I., and Sales Engineer for **General Alloys Company**, Boston.

## Wilson Steel Appointments

**Charles J. Lee** was elected recently to the office of Vice President of Wilson Steel and Wire Co., 49th Street and South Western Avenue, Chicago. He joined the company in 1950, coming from The Hanifin Co. in Chicago.

★ ★ ★

**Frank J. Washabaugh** was appointed Plant Superintendent last Spring. He was previously with the American Steel and Wire Division at New Haven, Conn.

★ ★ ★

**Robert S. Wareham**, after an association with the company for 3 years, was appointed Sales Manager on October 30 of this year. Prior to that he was a Lieutenant Colonel in the Air Force.

## IDA Makes Award

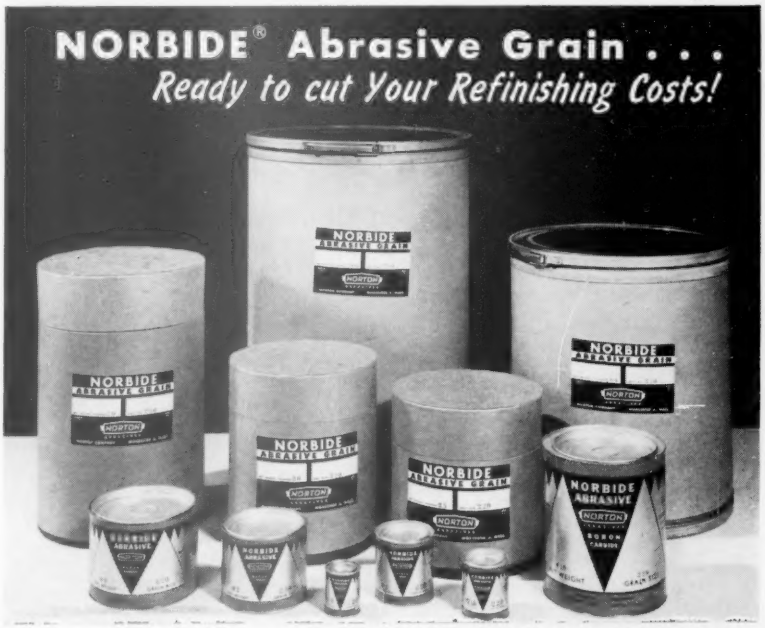
**The Industrial Diamond Association of America**, Pompton Plains, N. J., through its President, Jan Taeyerts, presented an award to **Sir Ernest Oppenheim** "for outstanding contribution to American Industry and, in particular, to the industrial diamond industry through sponsorship of educational activities, and exhibitions during the A.S.T.E. Industrial Show in Chicago, March 19-23, 1956."

★ ★ ★

**The** award continues with praise for "the inspired leadership by the company's Director, **E T. S. Brown**; Assistant Director, **Guy Young**; and **J. F. G. Custers and R. G. Weavind,** Directors of the Diamond Research Laboratory."

★ ★ ★

**The** award was made in Johannesburg, South Africa, on October 29, 1956.


If you are still using costly diamond dust for refinishing your wire drawing dies, you'll be amazed at the savings you can make by switching to NORBIDE Abrasive. Wire mills everywhere have found that this abrasive — the hardest manufactured abrasive commercially available — is ideal for ripping and semi-finishing operations.

Many of our customers order NORBIDE Grain in 100 lb. drums. Many others order and re-order ¼ lb. and ½ lb. cans. No matter what your requirements are we can fill your order promptly from stock.

*For details and prices on this cost-cutting abrasive write for Form 559.*

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NORBIDE® The hardest manufactured abrasive commercially available!

## Michigan Oven Appointments

**Three** executive appointments were recently announced by **A. C. Towne, Jr.,** President of the **Michigan Oven Co.,** designers and builders of industrial ovens.

★ ★ ★

**The** appointments include **E. C. Herrington,** Vice-President; **A. E. Johnson,** Vice-President, Walsh Metal Products, Inc.; and **B. C. Smith,** Secretary for both Michigan Oven Co. and Walsh Metal Products.

★ ★ ★

**Mr.** Towne states, "These appointments come in the wake of an over-all expansion of production and service facilities by the Michigan Oven Co. and its subsidiary, Walsh Metal Products."

## Zur Made Senior Engineer By Sunbeam

**Sunbeam Corporation,** Chicago, has announced the appointment of **John P. Zur** to the capacity of Senior Engineer.

★ ★ ★

A graduate in the 1934 class at Ohio State with a B. S. Degree in Metallurgical Engineering, Mr. Zur was the Metallurgical and Chief Engineer with the **Trauwood Engineering Co.,** from 1935 to 1951. He later joined **Lee Wilson Contracting Co.,** as Production Engineer from 1951 to 1954. Returning to Trauwood as a Vice-President in 1954, he recently joined Sunbeam as a Senior Engineer with the Industrial Furnace Division.

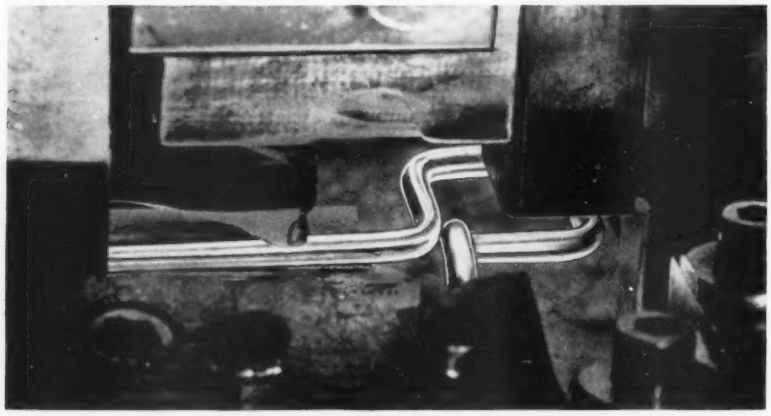
★ ★ ★

**Mr.** Zur is a member of **The Wire Association,** and a registered professional engineer (#8495) at Ohio State. Since 1935 he has been engaged in the design and construction of wire and strip heat treating equipment.


# NILSON 4-SLIDES PAY OFF 4 WAYS

• BIG PROFITS • BIG PRODUCTION

• BIG SAVINGS • BIG GAIN IN ACCURACY



Forming Operation: Meter Shunts of 3/16" Wire Stock

**WHY NILSON IS TOPS FOR 4-SLIDES:**

Nilson 4-Slides are built for rugged duty

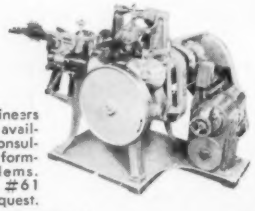
Form both ribbon metal and wire stock

Press capacities 8 to 75 tons, wire diameter to ½"

*16 Models Available, Including Combinations of Horizontal Press and 4-Slide*

**YOU PROFIT BY:**

Automatic Operation • Increased Production • No Secondary Handling • Improved Products • Fewer Rejects • Lowest Initial Cost



Nilson engineers are always available for consultation on forming problems. Bulletin #61 sent on request.

Nilson's 3 tilt and 3 stationary reels handle wire or ribbon stock coils up to 500 pounds.

A.H. NILSON MACHINE COMPANY

1516 RAILROAD AVENUE, BRIDGEPORT 5, CONN.

Automatic Chain Making Machines • Staple Forming Machines • Wire and Stock Reels • Wire Straightening Equipment • Slide Feeds for Presses • Wire and Ribbon Stock Forming Machines


## To Direct Sales for U. S. Industrial Chemicals

**Alden R. Ludlow Jr.,** has been named Director of Sales for **U. S. Industrial Chemicals Co., Division of National Distillers Products Corp.,** it has been announced by **Dr. R. E. Hulse,** Vice President of National Distillers and General Manager of U.S.I. Division. Mr. Ludlow succeeds **Lee A. Keane** who has retired.

★ ★ ★

**Mr.** Ludlow has been with U.S.I. since he was graduated from Yale University in 1934. He has been U.S.I.'s Manager of Alcohol Sales for the past ten years. During his long service with the Chemical Industry Mr. Ludlow has been a member of and taken an active part in many trade associations.

## To Represent Volco in St. Louis Area

**Appointment** of **Richard E. Hanson** of St. Louis as manufacturer's agent has been announced by **Volco Brass & Copper Co.,** Kenilworth, N. J. He will handle the full Volco line of brass, copper, bronze and nickel silver wire, rod and strip in a region comprising southern Illinois and Indiana and all Missouri.

★ ★ ★

**For** the past ten years, Mr. Hanson has been employed by Kaiser Aluminum in various capacities. He was district sales manager in

Kansas City and, more recently, assistant to the general sales manager and Kaiser's Chicago headquarters. Prior to this he was employed by Reynolds Metals Co. and Metal Good Corp.

### Vice President, Sales Appointed by Porter

**Sam Gurley, Jr.** has been elected to the post of Vice President-Sales for **H. K. Porter Co., Inc.**, according to announcement by Porter's President, **T. M. Evans.**

★ ★ ★

**Until** recently, Mr. Gurley held a similar position with Reichhold Chemicals, Inc. and previously had executive positions with Borden Company's Chemical Division and the Barrett Division, Allied Chemical and Dye Corporation. He is a graduate of the University of Missouri, a member of the Chemical Society, Tool Engineers Society and Plastics Society.

### Firth Sterling Elects Executive

**Kenneth D. Mann,** President of Firth Sterling Inc., announced the appointment of **Robert Logie** as Executive Vice President of the company. He has also been elected to the Board of Directors.

★ ★ ★

**Before** joining Firth Sterling, Mr. Logie had been connected with The National Roll & Foundry Company, and was president since 1950. During this period, the company reactivated its cast armor production for medium and heavy tank components, and diversified its production to include rolls for many non-ferrous industries, as well as specialized castings.

### William F. Brannan

**William F. Brannan,** 63, president of **Anchor Post Products, Inc.,** manufacturers of Anchor Fence, Baltimore, Maryland, died on December 1, 1956, in the University Hospital.

★ ★ ★

**He** joined Anchor Post Products, Inc., on April 1, 1919, as a salesman in its Cleveland, Ohio, branch office, moving to Baltimore in 1928, when he was elected president of Anchor Post. He served continuously in this capacity until his death. Under his direction the company became a leader in its field and sales volume grew from less than a million dollars a year to its present volume of approximately twenty million dollars a year.

### George Norman Fox

**The Spencer Wire Company Ltd.,** Wakefield, England, manufacturers of steel, copper and aluminum wire, has advised with sorrow of the death of **George Norman Fox,** Non-Ferrous Development Manager of the Company.

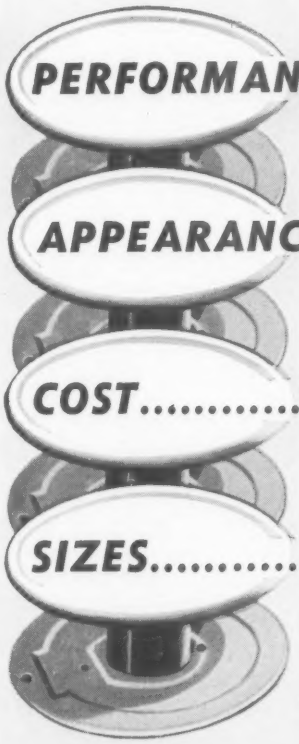
★ ★ ★

**Mr. Fox** was well known to the wire industry in England and had joined Spencer Wire two years ago, coming from **The Concordia Electric Wire and Cable Co. Ltd.,** with which he had been associated for many years and had been Director and General Manager.


Check MASON Spools for—

*lightweight, non-returnable, lithographed spools for:*

**INSULATED WIRE**
**THERMO-COUPLE WIRE**
**TV LEAD-IN WIRE**
**AUTOMOTIVE CABLE**
**SOLDER WIRE**



**PERFORMANCE...** Dependability that makes Mason Spools the choice of 175 manufacturers!

**APPEARANCE.....** Rich, colorful Mason lithography assures *instant brand recognition!*

**COST.....** Mason Spools have won the title "Best for *Less!*"

**SIZES.....** Mason lightweight, non-returnable spools are available in 5″, 6½″, 8½″ and 10½″ head sizes. All sizes are available with 1⅞″ (Dia.) barrels. The 10½″ head size is also available with a 3½″ (Dia.) barrel. Barrel lengths from ⅝″ to 14″.

LET US KNOW about your spool requirements *now!* Telephone East Providence 1-2810 or write to:

MASON CAN COMPANY

1949 Dexter Road, E. Providence 14, R. I.
Branch Plant — Greenville, Ohio

**His** untimely passing is keenly felt by his associates. He was sixty at the time of his death.

## Employers' Rights and Obligations

**In** the trying days which lie ahead, complete familiarity with the basic law under which labor-management relations are conducted is a vital necessity in all businesses, large or small.

★ ★ ★

A new 32-page booklet, "Employers' Right and Obligations Under the Taft-Hartley Act," prepared by NAM's Law Department under the direction of **Lambert H. Miller**, General Counsel, deals with certain sections of the law which are of special concern today, among them:

**organizational activities . . . employer's right of free speech . . . selection of bargaining representatives . . . employee conduct . . . union conduct, and collective bargaining.**

★ ★ ★

**This** booklet not only translates these provisions of the Act into simple, lucid terms but it also brings up to date the interpretations which have been established through NLRB decisions and court rulings. An employer or industrial relations executive seeking guidance can find it here, together with the citation of the original source of the ruling or interpretation.

★ ★ ★

**Copies** for executives and supervisors may be ordered at 25c each by writing to the **National Association of Manufacturers**, 2 East 48th St., New York 17, N. Y.

## Complete Line of Rolling Mills And Mill Auxiliary Equipment Covered in New Book

**The Waterbury Farrel Foundry & Machine Co.** is offering a new 36-page, two-color, illustrated book cataloging, for the first time in one volume, its complete line of rolling mills and rolling mill auxiliary equipment for ferrous and non-ferrous metal. Covering over 25 different types of machinery, the 8-1/2" x 11", plastic bound catalog has its contents conveniently grouped into three sections. The three sections cover; 1) Main Equipment; Strip Mills, Rod Mills, Special Mills, Gang Slitters and Chain Draw Benches, 2) Auxiliary Equipment for Strip, Rod, Wire and Tube Mills, and 3) References Tables including strip coil weight and length calculating graphs and tandem rod mill rolling schedules.

★ ★ ★

**The** references section includes; 1) a Strip Coil Weight Chart for calculating the weight of various size coils of steel, brass, copper or aluminum strip, 2) a Strip Coil Length Chart for determining the number of feet in a given coil, and 3) a Rolling Schedule for Waterbury Farrel Tandem Rod Mills.

★ ★ ★

**Copies** of this book may be obtained without charge by writing for Catalog R, The Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

SEE THE DIFFERENCE YOURSELF...
BETWEEN JUST ANY SPOOL AND
Superior MPS
NO-CREV SPOOLS
No-Crev Spools eliminate the conventional crevice at the inner junction of spool head and barrel. No more production slow-ups due to fine wires getting caught in such a crevice. You can now have continuous trouble-free high speed winding.
We invite your inquiries — let us tell you more about No-Crev Spools. Write us today.
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#108

## Metallurgy

**The** fourth edition of "Metallurgy," by **Carl G. Johnson,** Associate Professor of Metallurgical Engineering, Worcester Polytechnic Institute, and **William R. Weeks,** Assistant Professor of Industrial Technology, Western Michigan College of Education, has been published by the **American Technical Society,** 848 East 58th Street, Chicago 37, Ill.

★ ★ ★

**The** book contains 454 pages of text, is completely indexed and illustrated and stresses the importance of physical and chemical properties of metals for anyone who is concerned with the design, shaping, sizing and fabrication of metal products, covering among other things, rod rolling and wire.

★ ★ ★

**Since** technical knowledge of the behavior of metals is largely the organized results of years of shop practice, the authors present principles and practices governing the selection, testing and treatment of metals from the standpoint of practical applications.

★ ★ ★

**This** edition is greatly enlarged and contains the latest information available, with new data on bearing alloys, aluminum alloys, steel alloys, copper and copper alloys and heat treatment.

★ ★ ★

**The** book may be ordered from the American Technical Society or through a local bookseller.

## Hook-up Wire Produced by Haveg Industries

**"Teflon"** insulated hook-up wire is now available in sizes 16 to 28 from **Haveg Industries, Inc.,** of Wilmington 8, Del. Covering of "Teflon" insulation are in thicknesses of .010" to .015".

★ ★ ★

**This** wire of silver-plated copper is covered by the extrusion of a controlled thickness of "Teflon." Method assures a pinhole free coating for full utilization of the product's excellent dielectric properties.

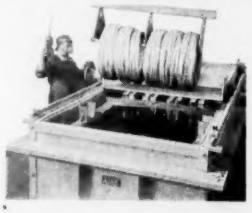
**Hook-up** wire meets National Aircraft Standards and Government Specification MIL-W-16878-B, both Type E (600 volt) and Type EE (1000 volt). It can be supplied for coding in any one of 16 colors. Spiral striping in various colors can also be supplied to meet customer requirements.

★ ★ ★

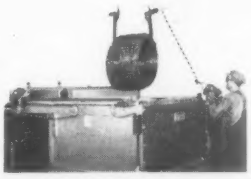
**This** "Teflon" coated wire is designed primarily for use in electrical appliances as hook-up wire, in distribution and power transformers, and aircraft, integral, and traction motors; also for use in chemical applications to meet extremes of corrosive conditions.

## Wire Products Firm Expands

**Robert J. Kahn** has leased approximately 45,000 sq. ft. in the former Delta Dyeing and Finishing plant, at Lewis and Ashland Streets, to **Sterling Wire Products Company** in Philadelphia. This is a new industry for the City and State, creating approximately 75 new jobs. The company manufactures furniture and bedding springs and wire products of all types.

TYPICAL — The Ajax installation at right treats 1000 lbs. of aluminum alloy wire an hour. It is also used for annealing brass and copper wire and for stress relieving cold headed C1008 ½" steel rods. (Lower left) 700 lb. charges of steel wire are brought to annealing temperature in less than 15 minutes, clean, scale-free and without decarburization.



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more uniform
heat processing
AT LOWEST EQUIPMENT COST

AJAX
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SALT
BATH
furnaces

Heating cycles are a matter of minutes . . . NOT hours. Bigger charges are handled far faster . . . in less floor space . . . in electric salt baths that cost about half the price of atmosphere furnace equipment of equal capacity. Molten salt seals out all air, preserves wire surfaces, guards against scale and decarb. Wire quality and uniformity are improved . . . because no other method matches Ajax Salt Baths for heating uniformity. Ideal for low- and high-carbon steels, stainless, aluminum, copper alloys and silver alloys.

**WRITE FOR** case history bulletins on ☐ Process Annealing; ☐ Descaling; ☐ Patenting; or ☐ Cleaning, Preheating or Fluxing. These describe actual Ajax salt bath installations and actual wire processing results obtained.

**AJAX ELECTRIC COMPANY**
928 FRANKFORD AVENUE., PHILADELPHIA 23, PA.

*Associates:* Ajax Electric Furnace Corporation • Ajax Engineering Corporation • Ajax Electrothermic Corporation

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— Same use as the well-known n° 1 Take-up but completely electrically regulated.

— Drums up to 30" flange diameter.

— Wires from 7 to 26 A.W.G.

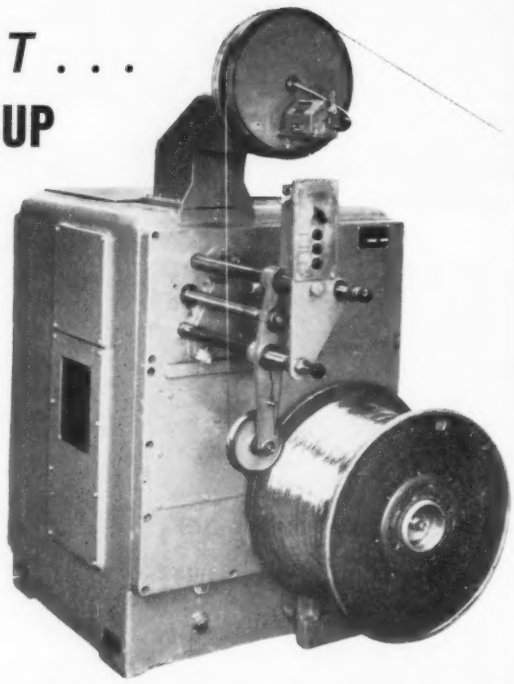
— No capstan.

— Constant linear speed (choice of speed with a potentiometer).

— No over-tension.

— Low speed motion allowing spiralling out of drum (for further welding).

— Air pressured unloading device.



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**SILVER PLATED COPPER WIRE**

**Concentric Stranded Bunched & Single End. 1¼-1½ to 4% Silver Coated on Copper by weight. Amount of Silver accurately controlled for thickness and purity to meet U. S. Government specifications.**

**Constructions supplied to your special design.**

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**WE ALSO SUPPLY:**

**NICKEL • NICKEL PLATED WIRE • RESISTANCE WIRES • MONEL • COPPER AND ALL TYPES OF STAINLESS STEELS—BOTH SINGLE END AND STRANDED FORMS**

***In Special Tempers, Annealed, Bunched and Stranded, etc.***

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**Telephone: Gilbert 4-2151**

# A Review of Recent Wire Patents

**The data listed below is only a brief review of recent patents pertinent to the readers and subscribers of this publication.**

**Complete copies of these patents may be obtained by writing to the publisher of this magazine and remitting 50¢ for each copy desired. For orders received from outside the United States the cost will be $1.00 per copy.**

No. 2,743,066, CONTINUOUS COIL WINDING MACHINE, patented April 24, 1956 by Eben Jefferson Crum, Baltimore, Md. Application June 5, 1952, Serial No. 291,923, 2 Claims (Cl. 242-79)

The machine is adapted to wind wire or rope into continuous or connected coils or skeins containing given lengths of the wire or rope. Means is provided for continuous peeling coils from the drum of the machine onto a take-off unit.

★ ★ ★

No. 2,769,180, METAL SUPPORT, MORE PARTICULARLY FOR BRASSIERES AND SIMILAR USES, patented November 6, 1956 by Georges Henri Tareau and Lucien Charles Wilhelm, Paris, France.

A single flat metallic wire of rectangular transverse cross section is provided for the frame or the support.

★ ★ ★

No. 2,769,192, WIRE BRUSHES, patented November 6, 1956 by Gebhard Satzinger, Bad Kissingen, Germany.

Individual wire bristle tufts are rigidly arranged in rivet-like sockets with a bristle guide arranged near the free ends of the bristles but adjustably longitudinally of the wire tufts.

★ ★ ★

No. 2,769,478, MACHINE FOR FORMING WIRE INTO A HELIX, patented November 6, 1956 by Edward H. Schane, Lakewood, Ohio, assignor to Fanner Manufacturing Company, Cleveland, Ohio, a corporation of Ohio.

The machine is adapted for forming a wire into a helix of predetermined pitch and diameter and includes a number of novel grooved rollers individually supported in a wire-receiving lengthwise passageway in a forming housing.

★ ★ ★

No. 2,769,531, WOVEN WIRE CONVEYER BELT, patented November 6, 1956 by Raymond J. Guba, Rydal, Pa., assignor to Audubon Wire Cloth Corporation of New Jersey.

More specifically, the invention resides in a drive means for a conveyor belt of the class constructed of helical coils arranged side by side with the turns of each overlapping and having uniform rods extending transversely of the belt through the aligned openings formed by the overlapping turns, with the least dimension of the openings, measured in a plane perpendicular to the rods, appreciably exceeding the rod diameter.

★ ★ ★

No. 2,770,262, MACHINE FOR FORMING SPRING-WIRE INTO ZIG-ZAG MATERIAL AND METHODS OF FORMING ZIG-ZAG SPRING MATERIAL, patented November 13, 1956 by Joseph Gauci, Jersey City, N. J., assignor to Springs, Inc., a corporation of New Jersey.

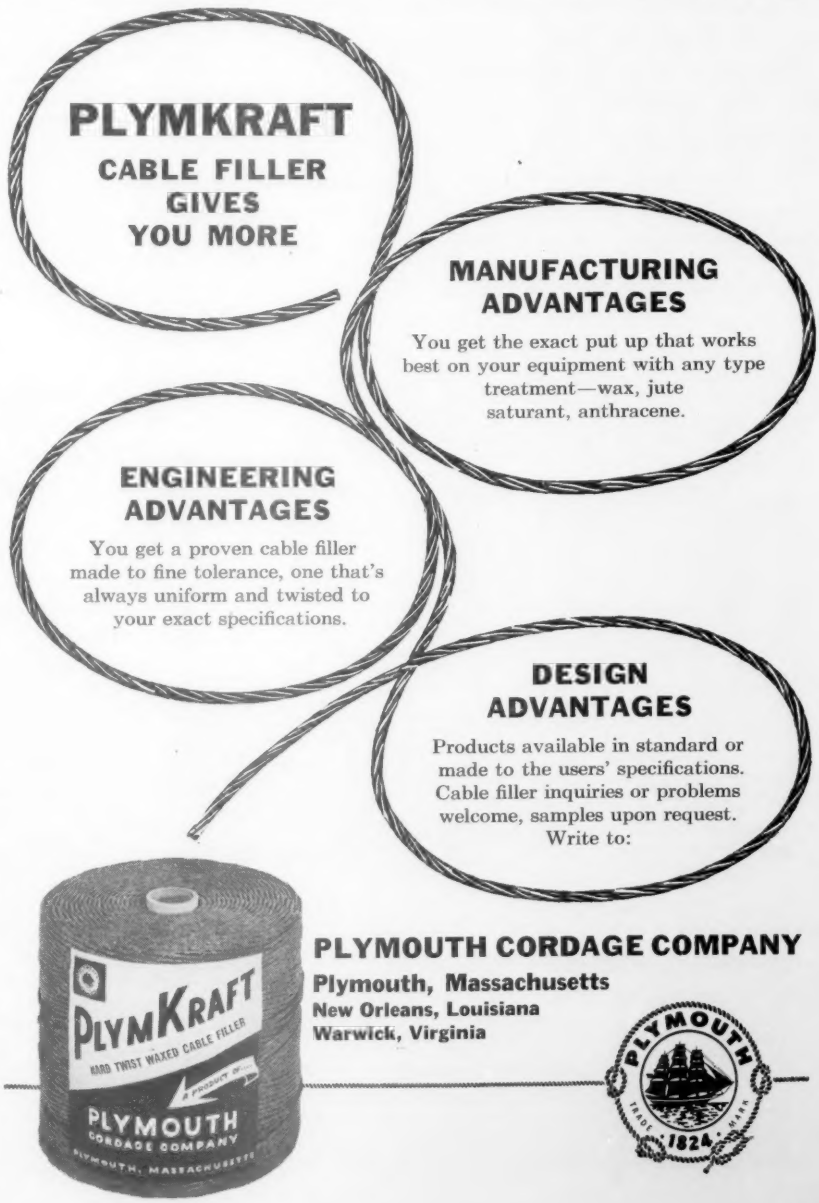
A support, a pair of centrally-disposed circular and grooved initial-bending wire-forming mandrels mounted on fixed axes of the support and having their peripheries arranged to provide a wire-feeding channel disposed therebetween to guide a section of wire, the wire being in contact with the peripheral surfaces of the initial wire forming mandrels, in combination with loop-forming means including a turret member movable in the arc of a circle about the centrally-disposed mandrels, and a pair of round wire-forming elements mounted on and carried by the turret to move about the centrally-positioned mandrels.

No. 2,770,998, TAMPER-PROOF SCREW HAVING FRUSTO-CONICAL HEAD WITH FLAT TOOL ENGAGING FACETS THEREON, patented November 20, 1956 by Robert F. Schwartz, New York, N. Y.

The screw includes a solid conical head integrally formed with the shank and being generally in the form of a frustum of a cone with a flat top and a flat base. The shank is provided with non-parallel flat facets.

★ ★ ★

No. 2,771,856, COIL FILAMENT COATING MACHINE, patented November 27, 1956 by Joseph R. Ardizzone, Newark and James M. Harper, East Orange, N. J., assignors to Westinghouse Electric Corporation, East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New Orleans, Louisiana
Warwick, Virginia
PLYMOUTH
TRADE MARK
1824

Pittsburgh, Pa., a corporation of Pennsylvania.

More specifically a coil waxing machine is disclosed comprising a device for gripping a coil intermediate of the ends thereof, a pan located beneath a position of the coil while gripped by the device and automatic mechanism for manipulating the gripping device and coil and introducing both ends of the coil successively into the pan.

★ ★ ★

No. 2,771,912, DEVICE FOR LONGITUDINALLY RESHAPING CORRUGATED WIRE SPRINGS, patented November 27, 1956 by Svend G. Blummensaadt, Beachwood Village, Ohio, assignor to The Universal Wire Spring Company, Bedford, Ohio, a corporation of Ohio.

The device is for changing the longitudinal spacing of successively connected left and right handed loops of sinuously corrugated wires.

## Crucible Steel Announces Expansion Plans

**The** Board of Directors of **Crucible Steel Company** of America have appropriated $25,000,000 for new plant facilities.

★ ★ ★

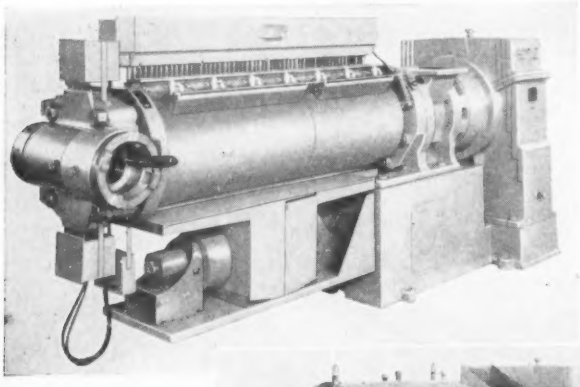
**In** announcing the Board's action, **Joel Hunter**, President, declared, "The new capital expenditure program includes a number of replacement and modernization projects which we expect to initiate and complete as rapidly as possible. This is in addition to the capital program of $20,000,000 now underway. There will be some increase in capacity, but the program is aimed chiefly at cost reduction and quality improvement. We expect to finance these expenditures from our own funds without recourse to outside financing".

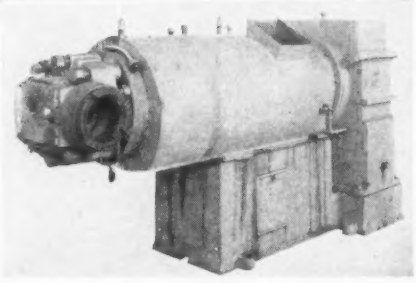
### COPPER STATISTICS

COPPER - Consumption of refined copper in the United States, August-September 1956, in short tons

| | Wire mills 1/ | Brass mills 2/ | Chemical plants | Secondary copper smelters | Foundries and miscellaneous | Total |
|---|---|---|---|---|---|---|
| August: | | | | | | |
| Cathodes | 887 | 7,059 | (3) | 94 | (3) | 8,040 |
| Wire bars | 68,673 | 6,657 | (3) | --- | (3) | 75,330 |
| Ingots and ingot bars | 1,623 | 6,074 | (3) | 121 | (3) | 7,818 |
| Cakes and slabs | ----- | 14,965 | (3) | 2 | (3) | 14,967 |
| Billets | ----- | 13,774 | (3) | --- | (3) | 13,774 |
| Other | ----- | ----- | (3) | 37 | (3) | 37 |
| Total | 71,183 | 48,529 | (4) | 254 | (4) | 4/122,966 |
| September: | | | | | | |
| Cathodes | 476 | 7,113 | (3) | 53 | (3) | 7,642 |
| Wire bars | 66,301 | 5,050 | (3) | --- | (3) | 71,351 |
| Ingots and ingot bars | 858 | 6,206 | (3) | 126 | (3) | 7,190 |
| Cakes and slabs | ----- | 12,894 | (3) | 1 | (3) | 12,895 |
| Billets | ----- | 12,252 | (3) | --- | (3) | 12,252 |
| Other | ----- | ----- | (3) | 31 | (3) | 31 |
| Total | 67,635 | 43,515 | (4) | 211 | (4) | 4/114,361 |

1/ Includes all wire mills with rod-rolling facilities. 2/ Includes all brass mills using copper in refinery shapes; some have rod-rolling facilities. 3/ Not available. 4/ Consumption by chemical plants, foundries, and miscellaneous plants not included. Estimate of 3,000 tons included in total.



8½" Spirod extruder with side delivery head for jacketing. Up-graded from circulating type shown to the right.

**EVER THINK OF UP-GRADING TO SPIROD®?**

Yes, it can be—and is being—done. And Royle's traditional approach to extruder development, the retention of features that have stood the test of time, makes it possible. The one-piece cylinder with built-in hopper is replaced by a separate cast steel hopper section, a cast steel cylinder with deep grooves that create fin-like separations for the rod type heating elements and the selective evaporative cooling equipment. Head and stock screw, as usual, are designed for process requirements.

If you are operating an older type Royle extruder you should investigate up-grading to Spirod—the electrically heated extruder with high velocity evaporative cooling—for maximum efficiency in controlled operating temperatures.

Write for Bulletin # 463

**JOHN ROYLE & SONS** — ROYLE PATERSON N. J. 1880

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Los Angeles, Cal. — H. M. Royal, Inc. — LUdlow 9-3261

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**AMERICAN IRON AND STEEL INSTITUTE**
150 EAST FORTY-SECOND STREET, NEW YORK 17, N. Y.

AIS 10

Total Number of Companies Included 131

OCTOBER - 1956
Month

## SHIPMENTS OF STEEL PRODUCTS
## ALL GRADES INCLUDING CARBON, ALLOY AND STAINLESS
(Net Tons)

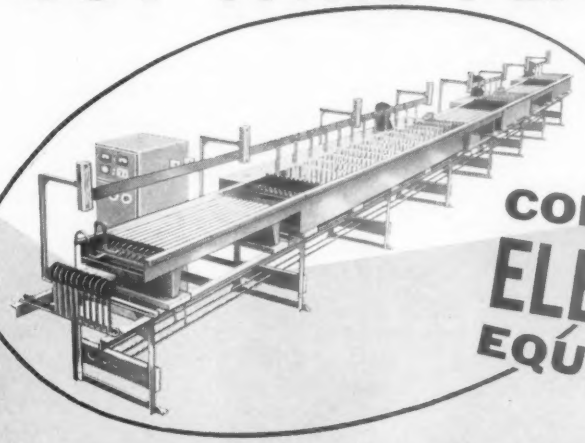
Covering Net Shipments (Excluding Shipments to Members of the Industry for Conversion into Further Finished Products or for Resale)

| Steel Products | Items | CURRENT MONTH 1956 Carbon | Alloy | Stainless | Total | Percent of Total Shipments | Prior Year (1955) Percent of Total Shipments | YEAR TO DATE 1956 Carbon | Alloy | Stainless | Total | Percent of Total Shipments | Prior Year (1955) Percent of Total Shipments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingots and Steel Castings | 1A | 35,308 | 18,915 | 3,195 | 57,418 | 0.7 | 0.9 | 411,072 | 158,952 | 25,296 | 595,320 | 0.9 | 0.7 |
| Blooms, slabs, billets, sheet bars | 1B | 144,372 | 51,586 | 3,213 | 199,171 | 2.5 | 2.9 | 1,372,620 | 462,250 | 25,300 | 1,860,170 | 2.7 | 3.3 |
| Tube rounds | 1C | 183 | 156 | - | 339 | - | - | 8,814 | 2,336 | 89 | 11,239 | - | - |
| Skelp | 2 | 21,993 | - | - | 21,993 | 0.3 | 0.2 | 153,126 | - | - | 153,126 | 0.2 | 0.2 |
| Wire rods | 3 | 118,815 | 1,421 | 664 | 120,900 | 1.5 | 1.5 | 891,719 | 16,341 | 4,310 | 912,370 | 1.3 | 1.4 |
| TOTAL SEMI-FINISHED | | 320,671 | 72,078 | 7,072 | 399,821 | 5.0 | 5.5 | 2,837,351 | 639,879 | 54,995 | 3,532,225 | 5.1 | 5.6 |
| Bars—Hot rolled (incl. light shapes) | 14 | 661,420 | 181,128 | 6,423 | 848,971 | 10.7 | 11.3 | *5,604,120 | 1,576,747 | 52,352 | *7,233,219 | 10.5 | 10.3 |
| Bars—Reinforcing | 15 | 249,655 | - | - | 249,655 | 3.2 | 2.8 | 2,028,127 | - | - | 2,028,127 | 3.0 | 2.6 |
| Bars—Cold finished | 16 | 122,250 | 24,038 | 6,169 | 152,457 | 1.9 | 2.4 | 1,177,600 | 241,674 | 49,504 | 1,468,778 | 2.1 | 2.2 |
| Tool steel | 17 | 1,358 | 9,432 | - | 10,790 | 0.1 | 0.1 | 14,666 | 92,639 | - | 107,305 | 0.2 | 0.1 |
| TOTAL BARS AND TOOL STEEL | | 1,034,683 | 214,598 | 12,592 | 1,261,873 | 15.9 | 16.6 | *8,824,513 | 1,911,060 | 101,856 | *10,837,429 | 15.8 | 15.2 |
| Standard pipe | 18 | 276,734 | 41 | - | 276,775 | 3.5 | 3.7 | 2,414,177 | 257 | 2 | 2,414,436 | 3.5 | 3.5 |
| Oil country goods | 19 | 222,221 | 34,755 | - | 256,976 | 3.3 | 3.3 | 1,797,123 | 305,565 | - | 2,102,688 | 3.0 | 3.0 |
| Line pipe | 20 | 332,696 | 2 | - | 332,698 | 4.2 | 3.7 | 2,723,673 | 39 | - | 2,723,712 | 4.0 | 3.7 |
| Mechanical tubing | 21 | 58,613 | 21,414 | 535 | 80,562 | 1.0 | 1.2 | 565,432 | 228,288 | 3,975 | 797,695 | 1.2 | 1.1 |
| Pressure tubing | 22 | 34,462 | 6,254 | 1,798 | 42,514 | 0.5 | 0.3 | 251,556 | 46,970 | 15,260 | 313,786 | 0.4 | 0.3 |
| TOTAL PIPE AND TUBING | | 924,726 | 62,466 | 2,333 | 989,525 | 12.5 | 12.2 | 7,751,961 | 581,119 | 19,237 | 8,352,317 | 12.1 | 11.6 |
| Wire—Drawn | 23 | 265,365 | 4,331 | 3,310 | 273,006 | 3.4 | 4.0 | 2,457,585 | 42,125 | 26,569 | 2,526,279 | 3.7 | 3.8 |
| Wire—Nails & staples | 24 | 52,082 | - | 1 | 52,083 | 0.7 | 0.7 | 492,712 | - | 2 | 492,714 | 0.7 | 0.8 |
| Wire—Barbed & twisted | 25 | 3,491 | - | - | 3,491 | 0.1 | 0.1 | 68,551 | - | 1 | 68,552 | 0.1 | 0.1 |
| Wire—Woven wire fence | 26 | 17,745 | - | - | 17,745 | 0.2 | 0.2 | 247,940 | - | - | 247,940 | 0.3 | 0.4 |
| Wire—Bale ties | 27 | 2,032 | - | - | 2,032 | - | - | 46,693 | - | - | 46,693 | 0.1 | 0.1 |
| TOTAL WIRE & WIRE PRODUCTS | | 340,715 | 4,331 | 3,311 | 348,357 | 4.4 | 5.0 | 3,313,481 | 42,125 | 26,572 | 3,382,178 | 4.9 | 5.2 |
| Strip—Hot rolled | 37 | 167,937 | 2,892 | 878 | 171,707 | 2.2 | 2.4 | 1,455,821 | 27,751 | 4,090 | 1,487,662 | 2.2 | 2.5 |
| Strip—Cold rolled | 38 | 114,978 | 1,376 | 18,829 | 135,183 | 1.7 | 2.2 | 1,136,717 | 15,136 | 171,575 | 1,323,428 | 1.9 | 2.0 |
| TOTAL SHEETS AND STRIP | | 2,582,190 | 113,814 | 37,059 | 2,733,063 | 34.5 | 38.6 | *22,999,990 | 983,925 | 328,124 | *24,312,039 | 35.4 | 37.9 |
| TOTAL SHIPMENTS (1956) | | 7,339,911 | 524,116 | 66,930 | 7,930,957 | 100.0 | xxx | 63,600,553 | 4,593,968 | 561,422 | 68,755,943 | 100.0 | xxx |
| TOTAL — PRIOR YEAR (1955) | | 6,631,174 | 522,899 | 62,748 | 7,216,821 | xxx | 100.0 | 64,755,178 | 4,570,740 | 563,506 | 69,889,424 | xxx | 100.0 |

* Revised.


CUT WIRE PLATING COST!

maintain uniformity on copper and aluminum wire



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## Circle Wire & Cable to Expand

**Circle Wire & Cable Corp.,** Maspeth, N. Y., wholly owned subsidiary of **Cerro de Pasco Corp.,** is expanding its operations to include production of wire and cable with aluminum conductors. The announcement was made by **Milton S. Cohn,** Circle president.

★ ★ ★

**An** initial order for the new aluminum cable has been received from the Long Island Lighting Company, and calls for self-supporting drop cable used to carry current from an overhead feeder line to metering equipment in individual homes.

★ ★ ★

**Mr.** Cohn said this is the first venture into the field of aluminum conductors by Circle, which previously has engaged in manufacturing over 100 electrical wire and cable products employing copper conductors exclusively.

## Simplex Installs High Voltage Impulse Generator

A new Philips impulse generator of advanced design, the first of its kind in the United States, rated 1,400,000 volts with an energy of 16 kilowatt-seconds, went into service recently in the High Voltage laboratory of **Simplex Wire & Cable Company,** Cambridge, Mass.

★ ★ ★

**The** installation will play an important role in the company's expanding research and development program. Studies will cover variations in mechanical construction of cable as well as insulation factors on materials of varying thickness. Investigations will give special attention to breakdown properties as a function of time and all work will be correlated closely with lightning, switching and power surge problems.

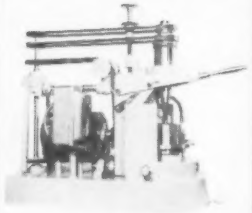
★ ★ ★

**The** new facilities supplement other high-voltage test equipment in the Simplex Laboratories for ac voltages up to 750,000 and dc voltages up to 500,000 volts to ground. The impulse generator installation was purchased from the Instruments Division, **North American Philips Co., Inc.,** Mount Vernon, N. Y.

## New Hydaulic Traversing Take-up Reel

**The Fenn Manufacturing Co.,** Newington, Conn., manufacturer of metal forming equipment, has announced a new line of traversing take-up reels to be used in combination with wire flattening mills. Model 2310 is floor mounted and has a 3" diameter spindle and a 10" stroke, including any combination of traverse and adjustment across the roll face which add up to 10 inches. Maximum weight of stock which can be coiled on this reel is 2000 lbs., and the maximum permissible stock tension is 300 lbs. The spindle is mounted on one front bronze bearing and two rear ball bearings, allowing both axial movement for traversing and rotary motion for winding, and can mount a drum with an I. D. of 16 inches, O. D. of 36 inches and a face of 9 inches. The reel can be driven with its own motor and controls to provide a constant tension. This type of reel is available in both larger and smaller sizes. For complete information write to Fenn Manufacturing Co., Fenn Road, Newington, Conn.


# Only DYKREX-ROOS
## Makes a complete line of
## NEW
## Wire Die Finishing Machines!



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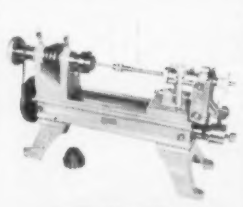
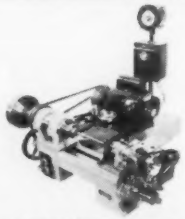
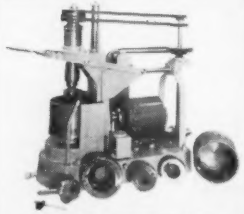


SEMI-AUTOMATIC POLISHER



AUTOMATIC POLISHER



INDUSTRIAL TYPE LAPPER FOR LARGER DIES

## Condensed Design Data Bulletin Issued by Heli-Coil

**Condensed** performance data, design relationships, installation procedure and standard size data for the design engineer, production supervisor, service manager, sales manager and maintenance man in all branches of industry is contained in a new four-page bulletin—"Designing Your Product"—offered by the **Heli-Coil Corp.** Illustrated with application drawings and photos the booklet contains design data and specifications for cutting costs with screw thread inserts.

★ ★ ★

**In** addition to presenting military specifications, classes of fit and assembly proportions, the booklet outlines hand and power operation techniques that can be used for installing the Heli-Coil insert. Tables give the complete range of sizes for the screw thread, Screw-Lock and special inserts.

★ ★ ★

**Copies** of Bulletin No. 748 are available from Heli-Coil Corp., Danbury, Conn.

## Process to Produce Alumina from Clay Developed

**The Anaconda Company** has announced that after two years of laboratory and test plant work it has solved the problem of producing alumina from clay located in the area of Moscow, Idaho. Company spokesmen state that the alumina thus produced has been within the specifications required for alumina extracted from bauxite. Alumina is the substance from which aluminum is made. The principal sources of bauxite for the United States are the islands of the Caribbean. Alumina is contained in commercial quantities in some of the clays of the United States.

★ ★ ★

**Attempts** had been made without success by the United States Bureau of Mines and other agencies for more than 25 years, to solve the problem of extracting alumina from these domestic clays. It was not, however, until May of this year that a test plant that had been constructed by Anaconda was finally successful in producing a commercial grade of alumina. From the pilot plant stage, a full scale plant will be designed and built to supply the company's needs.

## New Rod Mill Goes Into Operation

**Atlantic Steel Company** gave added impetus to the industrial growth of the Southeast as its new $8.5 million merchant bar and rod mill was placed into operation and dedication ceremonies, held on November 13, were attended by more than 150 leaders from business, industry, labor, and government.

★ ★ ★

**Robert S. Lynch**, president of the Atlanta firm, said the new mill is visible evidence of the company's and employees' confidence in the future growth and prosperity of the South. **Mrs. Joseph H. Girdler**, wife of Atlantic Steel's vice-president in charge of operations, touched off the signal for the rolling of the first bar.

. . . for the BEST in WIRE MACHINERY
THINK OF WIM
YOU CAN TELL THE DIFFERENCE ★★★★
WIRE INSULATING MACHINERY, INC.
. . . . . manufacturers of
• HIGH SPEED PACKAGING SPOOLERS WITH INDEXING HEADS
• HIGH SPEED RESPOOLERS
• TINNING TAKE-UPS
• PAYOFF STANDS
• CONTINUOUS COILERS
• LUMP DETECTORS
Phone, write or wire for complete details
W I M
WIRE INSULATING MACHINERY, INC.
Division of Machinery Electrification, Inc.
35 HUDSON ST. NORTHBORO, MASS.

**The** new rolling mill, designed to be one of the fastest of its type in the world, has a finishing speed of 5,000 feet per minute on wire rods. It has over three times the production capacity of the company's old bar and rod mill, and is capable of producing a greater range of products than was formerly possible.

### New Bulletin on Mechanized Heat Treating

**A** new Surface Bulletin explains the economic features of completely mechanized heat treat lines.

★ ★ ★

24 basic furnace mechanisms are shown with isometric drawings. Photos and diagrams illustrate the steps to be used in building automated lines to insure better end product quality with absolute accuracy.

★ ★ ★

**The** new Bulletin SC-176 is a comprehensive commentary on mechanized heat treating. For your copy write to Surface Combustion Corp., Toledo 1, Ohio.

### Carpenter Steel Adds Houston Warehouse

**A** new mill-branch warehouse and office has been opened in Houston, Tex., by **The Carpenter Steel Company** to help meet the growing need for specialty steels in the Southwest.

★ ★ ★

**Purpose** of the new installation is to provide prompt sales and technical service to users of tool, stainless and alloy steels in Texas, Louisiana, Mississippi and the Mobile, Ala., area.

★ ★ ★

**Charles E. Miller,** recently appointed Houston branch manager, will be in charge of the warehouse. He will be assisted by **John D. Wilson,** sales representative. The warehouse operates under the jurisdiction of **W. J. Ervin**, Carpenter district manager at Indianapolis, Ind.

### Techalloy Offers Catalog

**Techalloy Company,** Rahns, Pa., has published a new Catalog and Price List No. 11, describing the many forms of rod, wire, strip and flat wire processed by them. These include, Monel, Inconel, Stainless Steel, Heat Resisting Steels, Copper and Nickel Clad Wires, Electrical Resistance Alloys and other nickel alloys.

★ ★ ★

**Copies** of this Catalog are available upon request to the company.

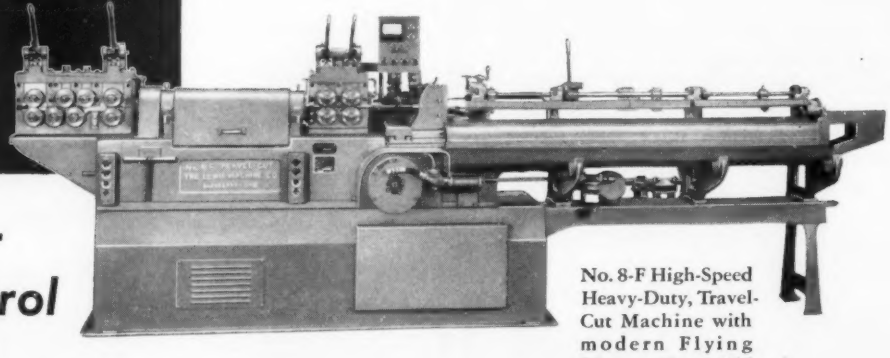
### New Wire Silver Plating Process

**The International Silver Company** and its affiliate, the **Times Wire & Cable Company** of Wallingford, Conn., have announced the development of a new process for silver plating copper wire. It is described technically as "a low current density method of plating." Specially automatic processing equipment has been perfected by International Silver Company's engineers to turn out silver coated


WIRE STRAIGHTENING AND CUTTING with Air Clutch and Air Brake

for better quality control

• Greater accuracy with a minimum of spot swell is achieved through three important improvements on the famous Lewis Travel-Cut Wire Straightening and Cutting Machines . . . Wichita Air Clutch and Brake and Reeves Variable Speed Drive. There are 34 models in the Lewis line from .012" to ¾" rounds and shapes at speeds up to 200 FPM. Write for new brochure.



No. 8-F High-Speed Heavy-Duty, Travel-Cut Machine with modern Flying Shear Cut-Off Mechanism. Handles 5/32" to 3/8" dia. wire at speeds up to 200 FPM.

THE LEWIS MACHINE COMPANY

3441 EAST 76TH STREET • CLEVELAND 27, OHIO

wire to meet industrial needs.

★ ★ ★

**Lawrence DeGeorge,** vice president of the Times Wire, said that the electrolytic method of plating provides a mass produced silver-plated copper wire with a plating of a degree of uniformity that has heretofore been unobtainable. They can now deposit from 1¼% by weight to as high as 6% by weight of highly adhesive silver plating to copper wire and guarantee uniformity of plating to within 1%.

★ ★ ★

**It** is this adhesiveness as well as well as the uniformity that is so important, for it allows this wire to be redrawn to extreme fineness and still maintains a complete plating in the same proportion of thickness as the original deposit.

## Brochure Covers Toggle Headers for Screws and Rivets

A new, 8-page, two color 8½" x 11" booklet offered by **The Waterbury Farrel Foundry & Machine Co.,** Waterbury, Conn., gives complete information on the company's line of Toggle Headers.

★ ★ ★

**Text,** photographs, reference tables and drawings are used to describe the machines used for upsetting heads on screw and rivet blanks and forming tubular rivet blanks. The Toggle Headers covered have production speeds of 100 to 150 blanks per minute, while the Tubular Rivet Headers are rated at 100 per min.

★ ★ ★

**The** booklet explains the basic wear-saving advantage of the single cycle, two-blow principle. Under separate headings the brochure covers operation, feed mechanism and adjustment, cutoff with automatic safety slip device, blank transfer, punch shifter and adjustment, blank knockout, motor drive and both standard and special tooling.

★ ★ ★

**In** the special equipment section, Spring Finger Knife and Knockout Relief mechanisms available on these machines are described. A close-up photo and schematic drawing are used to show the operation of the knockout relief device.

★ ★ ★

**For** a copy write to The Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., requesting Circular No. 854-A-4.

## New Price List on Carboloy Blanks

A new price list covering made-to-order Carboloy carbide blanks is announced by **General Electric's Metallurgical Products Department,** Detroit.

★ ★ ★

**The** publication, which reflects latest carbide prices, effective as of Oct. 19th, covers semi and modified standard Carboloy cemented carbide blanks as well as solid cemented carbide cylinders.

★ ★ ★

**The** 35-page publication is referred to as GT-314. It includes "how to order" instructions, and specifies shapes subject to extra charges.


*Wrap it up with* **TERKELSEN'S** Model 4-B

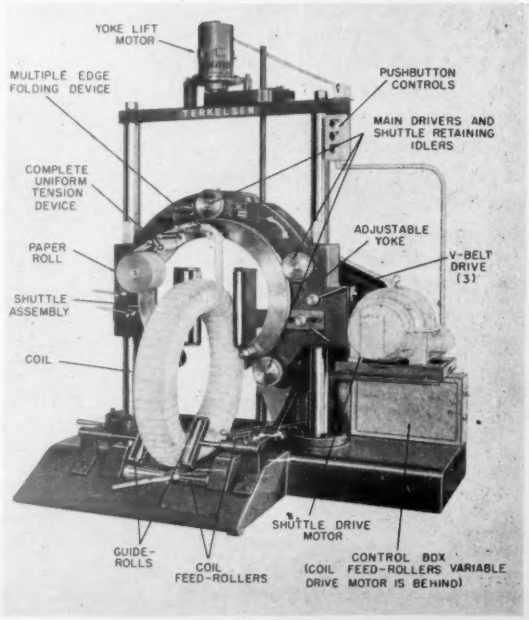
**WRAPPING MACHINE**

Terkelsen's Model 4-B Wrapping Machine is one of 20 spiral wrapping machines that are included in our standard line. The Model 4-B has been designed to wrap a wide range of coils from 30" to 50" outside diameter with a cross-sectional diameter of up to 14".

Among the many outstanding features of this machine are the following:

- **PUSHBUTTON CONTROL** *rotates coil in either direction.*
- **HIGH-SPEED PRODUCTION** *unequalled by any machine.*
- **TIGHT & UNIFORM WRAP** *of every coil.*
- **VARIABLE SPEED FEED ROLL DRIVE** *to obtain any desired overlap.*

For additional information on the Model 4-B or any of our other wrapping machines (for either coils or straight lengths), write to:




**TERKELSEN** *Machine Company*

**Terkelsen Building — 326 A Street Boston 10, Massachusetts**

*World's Largest Manufacturer of Spiral Wrapping Machines*

Member WAS

faster butt welding

good acid neutralizing

longer storage with safety

rust inhibitor coating

longer die life

you get them all with . . .

BORAX 5 MOL.

*and* ONE DIP *is all that is necessary for coating wire and steel rods . . .*

BORAX 5 MOL offers worthwhile advantages over regular borax as a satisfactory coating material on ferrous rods and wire in preparation for dry drawing. This newer material offers a higher concentration of sodium borate and therefore savings may be realized through reduced transportation, handling, and storage costs. Only about three-fourths as much Borax 5 Mol need be used to equal regular borax . . . yet you get the same worthwhile results!

*Write to our Technical Department for further information*

United States Borax & Chemical Corporation

PACIFIC COAST BORAX COMPANY DIVISION

100 Park Avenue, New York 17, N.Y.
630 Shatto Place, Los Angeles 5, Calif.

Los Angeles · Chicago · Philadelphia
New York · Kansas City · Cleveland

## The Story of the 1956 Annual Convention of The Wire Association

(*Continued from page* 54)

ment, going progressively through the rod mills, the cleaning house, the heat treating department, the wire mill, galvanizing department, chain link galvanizing room, fence department, nail department, patenting and oil tempering departments and finally through Pittsburgh Steel's new construction products building.

★ ★ ★

**Here** they were able to see the 96-inch fabric machine, that handles as many as 49 longitudinal wire strands at one time, with spaces between them varying from two to eight inches, as specifications may require. Transverse wires may be spaced from two to sixteen inches apart.

★ ★ ★

**Six** major exhibits were set up at appropriate points along the line of tour that showed the end-uses of many types of Pittsburgh Steel's wire in the form of fabricated products.

★ ★ ★

**The** trip through the plant took approximately two hours at the end of which, the people were taken to the Twin Coaches for a buffet luncheon as guests of the company.

**John Sanderson talking with Andrew Koltash (coat over arm), general foreman of the wire departments, in the oil tempering department of Pittsburgh Steel Company.**

ANACONDA®

copper and copper-alloy

WIRE in all

Commercial Tempers

and Sizes including

Round, Flat, Hexagonal

and Special Shapes.

**WIRE FOR SPECIAL PURPOSES**

Copper, Brass, Bronze, Everdur, Formbrite* (Superfine-grain Brass) and Nickel Silver in special grades for the manufacture of rivets, nails, pins, piano hardware, etc. Fine Wire on spools.

**RESISTANCE WIRE**

Nickel Silver.

**WEAVING WIRE**

Bronze
Brass, Nickel Silver, Everdur*, Phosphor Bronze, Copper and Fourdrinier Wire.

**SPRING WIRE**

Brass, Phosphor Bronze, Duraflex* (Superfine-grain Phosphor Bronze), Everdur.

*Trade Mark Reg. U.S. Pat. Off.

THE AMERICAN BRASS COMPANY

Waterbury 20, Conn.

District Sales Offices in Principal Cities

*Warehouses in:*

Chicago, Cleveland, Milwaukee
Philadelphia, Providence, Dallas

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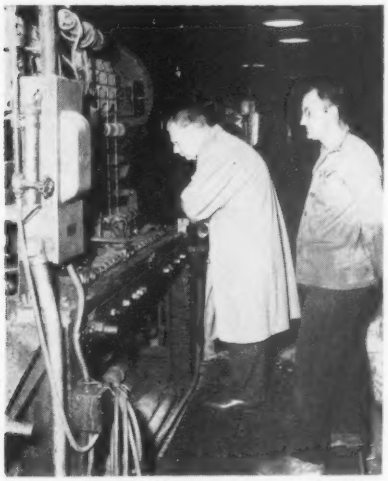
**These** two plant inspection trips concluded the official activities of the 1956 Annual Convention.



Visitor shows keen interest in one of Pittsburgh Steel's fence machines.

## Conclusion

**Chuck Williams,** General Program Chairman, and his two able lieutenants, **Hugo W Biskeborn,** Non-Ferrous Program Chairman, and **William Mohr,** Ferrous Program Chairman, are to be congratulated upon the highly successful culmination of their year-long efforts to arrange for the many details of the Convention.

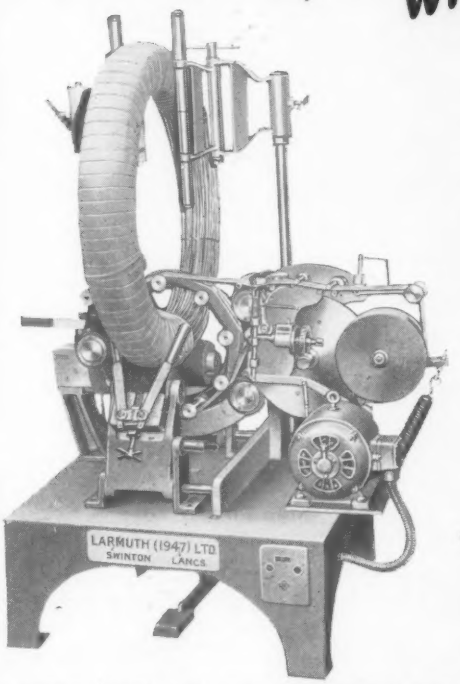
★ ★ ★

**To** them, their committee members, the speakers and the Chairman of the Entertainment Committee, **Eber J. Hubbard,** we all owe a vote of thanks and gratitude. The Officers and Directors of the Association are particularly grateful for the fine cooperation of all who in any manner contributed to making this Convention outstandingly good and enjoyable.

## Hipot Tester Bulletin Issued

**Literature** is now available describing the "H" series of Sensitive Hipot Testers, manufactured by **Peschel Electronics, Inc.,** 13 Garden Street, New Rochelle, New York. For a copy, please write the company, which manufactures a full line of dielectric testing equipment.


LARMUTH *Spiral Wrapping* MACHINES




are built to finest British engineering standards and are in use throughout the world for spiral wrapping of Motor Tyres, coils of Wire, Strip, etc., from 3" bore upwards. Also straight length Tubes, Bars, Rods, etc.

"BOUND" to get there safely.

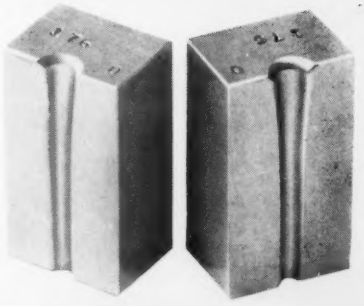
Please send detailed dimensions of your products.

LARMUTH of England

LARMUTH (1947) LTD., EAST LANCASHIRE ROAD, SWINTON, MANCHESTER, ENGLAND.
Telephone: Swinton 1015

*Sjogren* POINTING DIES

SJOGREN Pointing Dies have proven themselves! Made from shock-resisting high grade steel they assure many hours of hard, continuous usage. Fit your swaging machines with these rugged, S & S Pointing Dies, made to order on your specifications, they guarantee you service.



SINCE S&S 1927

*Used by Wire Men Who Want the Best!*

SJOGREN TOOL AND MACHINE CO., INC.

WIRE PULLERS • WEDGE GRIPS • JAWS FOR ALL MAKES OF PULLERS AND TESTING MACHINES • CAGE ROLLERS • SWAGING HAMMERS • POINTING DIES • WIRE SPOOLERS

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MASSACHUSETTS

*For Superior Results Use*

ROME

**WIRE DRAWING COMPOUNDS**

**for**

**STEEL, COPPER, BRASS, ALUMINUM, ETC.**

These new compounds for both WET AND DRY WIRE DRAWING have been under development and field test for 2 years and are showing superior results in leading wire mills, with savings in wire production—and in *original cost.*

***Write or telephone for full information***

**ROME SOAP MANUFACTURING COMPANY**

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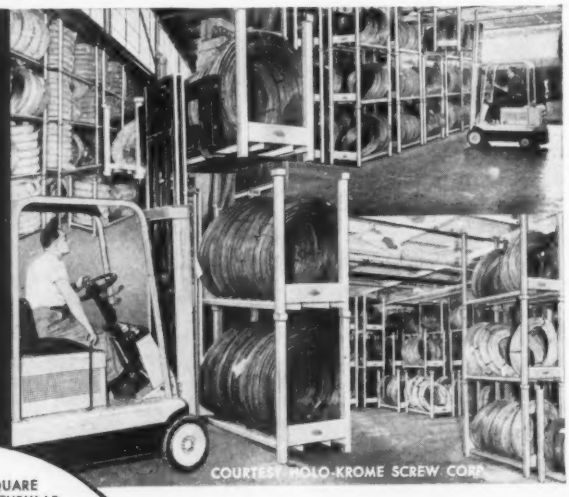
— MANUFACTURERS OF INDUSTRIAL SOAPS SINCE 1896 —

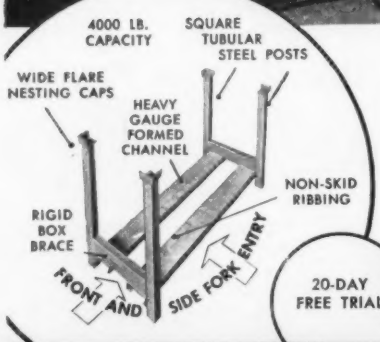
**JARKE**

PORTABLE

**WIRE COIL RACKS**



COURTESY HOLO-KROME SCREW CORP.




**Solve Wire Coil Storage Problems**

Makes handling and storing of unwieldy wire coils a simple one-man operation. Improves plant housekeeping, saves space, provides positive inventory control. Front and side fork entry permits closer stacking and greater maneuverability in narrow aisles. Saves time, labor, cuts costs. Standard and special sizes.

20-DAY FREE TRIAL

JARKE MANUFACTURING COMPANY

*Send for Details*
5405 Broadway
Chicago 40, Ill.

MODULAR STORAGE SYSTEMS FOR METAL INDUSTRY - STEELMOBILE

## Fulfillment of a Trust

(*Continued from page* 43)

bank for a loan you borrow on a LCL interest rate compared with the major producers. Therefore you need the less than carload extras to pay the tariff and realize the profit."

★ ★ ★

**Jack's** fourth point was to appreciate and to cultivate the suppliers of processes and machinery to the wire industry. He frankly believed that the development of the industry would not come wholly from within, but from the suppliers of the industry. That they in their search for an expanding market would, in a major degree, contribute science, engineering, and guidance to the production staffs of all the wire producing plants. As an anology he pointed out that in his own mill at that time a supplier was furnishing carbide dies on a guaranteed cost per ton basis allowing him to produce a better product with less scrap and rejections. Needless to say, carbide dies were used in our plant. Over the span of 25 years, I have found the suppliers of processes and machinery and materials used in the production of wire and wire products to be solicitous and cooperative towards solving the wire mill production problems—either large or small. I respectfully salute them for their many contributions to our industry.

★ ★ ★

**Point** number five emphasized the relationship of labor to management and a firm belief that labor was an integral part of production and was entitled to a fair day's wage for a fair day's work, and a premium for effort beyond the ordinary line of duty. Perhaps this point registered most deeply in my mind. I recalled the history books describing the feudal days of early England when man was neither master nor serf; the revolution of serfdom and the amalgamation of groups of serfs in cooperative ventures called Guilds to produce collectively and share alike in the profits of their labor. Such attitudes may be one of the facets

of success—at least we find that the policy of division of profits with labor has been no detriment to our industrial growth. Our corporate records show an even distribution of earnings between capital who supplied the brick and mortar, and labor who supplied the "blood, sweat and tears."

★ ★ ★

**Jack's** sixth point was probably the forerunner of the four-way test given to Rotarians by their International President on their 50th Centennial which reads: "Is it the Truth?" "Is it Fair to All Concerned?" "Will it Build Good Will and Better Friendship?" "Will it be Beneficial to All Concerned?" Jack Mordica's sincere belief was that quality was paramount, and that a sale was "The delivery of merchandise that would not come back—to a customer that would."

★ ★ ★

I probably don't have to enlarge on Jack Mordica's seventh and final recommendation for success. It is the policy of the open door which is symbolic of this convention. **Major Richard E Brown,** our executive secretary and co-founder, has carried this gospel to all corners of our industry and I salute you, **Richard Brown,** for your efforts and success. Jack Mordica had a way of expressing this open door policy. He believed that only by divulging new ideas and working collectively for their development would the industry rapidly progress. The maestro, Jack Mordica, had spoken.

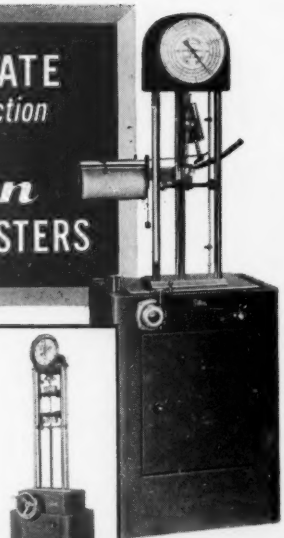
★ ★ ★

As we were about to leave I thanked Jack for his interest in our cause, his time and advice to an embryo business and in parting as new and old friends, I said, "Jack, how can I ever repay you for your time, your sincere interest and solid advice?" His reply was, "Ken, if what I have told you contributes to your success and the success of your ventures, I trust that you will pass it along to those who can and will use it."

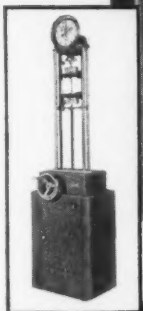
★ ★ ★

So, today I give you the fulfillment of that trust.


THE ULTIMATE
*in testing perfection*
*Dillon*
UNIVERSAL TESTERS



Here's a low cost tester that operates in tensile, compression, transverse or shear. This inexpensive instrument can make *hundreds* of accurate checks daily on metal, plastics, wire, rubber, springs, etc. Handles round, flat or special shapes. More than 15 gripping fixtures available. Max. indicator. Self-aligning grips. Hand wheel operated or motorized. Meet ASTM & Fed. specs. Rugged & fast. Calibrated with certified dead weights. Recorder optional. Max. capacity 300 lbs.



MODEL M. For low strength materials between 0 & 300 lbs. Pendulum-type with 5 scales.

MODEL L. Heavier unit for materials up to 125,000 lbs. PSI. 7 interchangeable gauges provide wide range.

*Write For* brochures and LOW price schedule ... today!

W.C. *Dillon* & CO., INC.

14618AN KESWICK ST., VAN NUYS 51,
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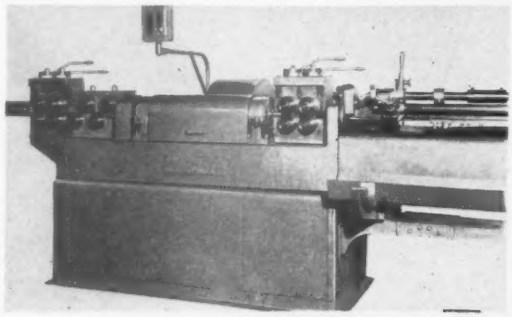
**New, Fast STRAIGHTENER and CUTTER**

**Handles 1/4" to 1/2" Wire—3" to 50' Lengths**



**Model 9A, pictured, is for ferrous or non-ferrous heavy wires. Other models accommodate smaller stock.**

**The 9A feed and speed can be varied from 70 to 200 feet per minute.**

OTHER FEATURES

Wichita low-inertia air tube clutch and air brake makes quick, clean and positive cut-off possible. Electric actuated trip. Motor control switch on swinging pendant. Tool storage in base. Bundling brackets. End pull-through device. Two 4-roll feed housings for positive feeding. Many other refinements—all features of the 9A and other models for finer wires.

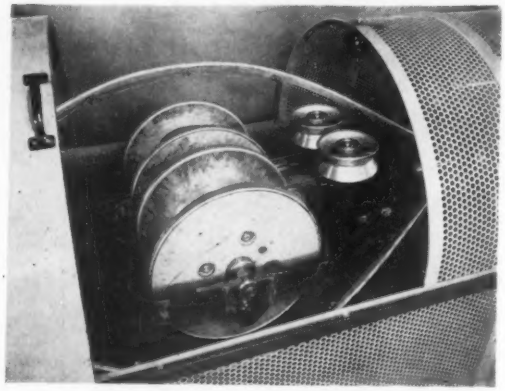
**ALSO MANUFACTURERS OF WIRE REELS AND HI-HATS.**

***Send your requirements and ask for details.***

**The Geo. C. PATTERSON MACHINE Company**

**3409 Trumbull Street • Cleveland 15, Ohio**

## TWO-WIRE DOUBLE TWIST CONSTANT TENSION TWISTING MACHINE



Designed and built for the uniform twisting of finer wires as small as No. 26 gage.

Tension control is combined with over run prevention and slow acceleration to permit the use of large reels and long lengths of small diameter wires.

Speeds up to 2280 lays per minute.

Reel sizes up to 24 inches diameter and 9¼ inches overall width or 19 inches diameter and 13½ inches overall width.

These machines are very efficient high speed units.

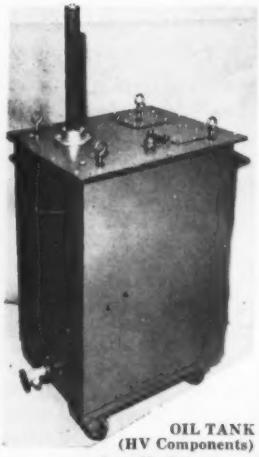
*For information on this efficient machine, write:*

**THE EDMANDS CO.** 860 WELLINGTON AVE., CRANSTON 10, R. I.

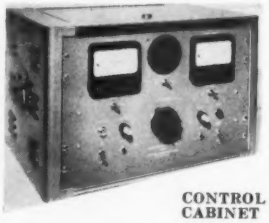
Tel. STuart 1-2205

## 100 KV DC TEST SET (Overpotential Testing)

### For Non-Destructive Insulation Testing of Sample, or Full Reel Tank Testing.



OIL TANK (HV Components)



CONTROL CABINET

1. Con. var., 0-100 KV output voltage.
2. Adequate cap. for rapidly charging full reels.
3. Automatic output shorting.
4. External (aux.) interlock provision for test cage.
5. KV meter and current meter for determining leakage resistance—both meters dual range.
6. Adj. overcurrent trip-out—deenergizes HV.
7. Incorporates all safety and convenience features.

**Available in other ranges, from 5 KV to 200 KV.**

Also, a complete line of Test Equipment for any required test on wire and cable, per IPCEA, NEMA, MIL, JAN, USAF, ASTM, and all other standards.

***Write, wire or telephone for Test Equipment Catalog.***

**PESCHEL ELECTRONICS, Inc.** 15 Garden St., New Rochelle, N. Y. Tel.: NEw Rochelle 6-3342


## The Diamond Jubilee of Consolidated Edison Underground Cable

(*Continued from page 60*)

| | |
|---|---|
| | l'Opera, Paris, France (Jablochkoff) |
| 1879 Apr. 29 | 1st Street Arc Light Line in U.S.: Public Square, Cleveland, Ohio (Brush) |
| 1879 Sept. | 1st Commercial Arc Light Line in U.S.: San Francisco, California (Brush) |
| 1880 Jan. 1 | 1st Experimental Incandescent Light Line in World: Menlo Park, N. J. (Edison) |
| 1880 Dec. 18 | 1st Permanent Street Arc Light Line in U.S.: Broadway, N.Y.C. (Brush) |
| 1882 Sept. 30 | 1st D.C. Hydro-electric Power in World: Appleton, Wis. (Edison) |
| 1883 Jan. 19 | 1st D.C. Commercial Incandescent Light Line in World: Roselle, N. J. (Edison) |
| 1883 Mar. 20 | Edison patents 3 Wire Distribution System |
| 1883 May 24 | Brooklyn Bridge illuminated by 70 Weston Arc Lamps |
| 1883 July 4 | 1st D.C. 3 Wire Overhead Distribution System in World: Sunbury, Pa. |
| 1885 | Westinghouse Purchases Gaulard & Gibbs A.C. System of Distribution |
| 1886 Mar. 16 | 1st 3000V 1Ø Experimental A.C. Line in U.S.: Gt. Barrington, Mass. (Westinghouse) |
| 1886 | 1st 2000V A.C. Transmission Line in World: Cerchi Tivoli-Rome, Italy 17 miles |
| 1886 Nov. 30 | 1st Commercial A.C. System in U.S.: Buffalo, N.Y. (Westinghouse) |
| 1887 June | 1st D.C. Hydro-electric Line in U.S.: Colton-San Bernardino, Calif. 8 miles |
| 1889 | 1st 1,000V 1Ø 133 cycle A.C. Line in New York City (Westinghouse) |
| 1889 June 3 | 1st 4,000V 1Ø 125 cycle A.C. Line in U.S.: Oregon City-Portland, Ore. 14 miles |
| 1891 | 1st 3,000V A.C. Line for Industrial Power in U.S.: Telluride, Col. 3 miles |
| 1891 | 1st 30,000V 3Ø A.C. Line in World: Lauffen-Frankfort, Germany 100 miles |
| 1892 Nov. 28 | 1st 10,000V 1Ø A.C. Line in U.S.: San Antonio Canyon-Pomona, Calif. 14 miles |
| 1893 Mar. | 1st 4-5 KV 3Ø A.C. Line in U.S.: Hartford, Conn. |
| 1893 July 13 | 1st 11KV Transmission Line in U.S.: Folsom-Sacramento, Calif 22 miles |
| 1893 | 1st 12 KV Polyphase A.C. Line in U.S.: Housatonic-Gt. Barrington, Mass. 7 miles |
| 1895 | 1st 2000 2Ø 25 cycle A.C. Line in U.S.: Niagara Falls, N. Y. |

| | |
|---|---|
| 1895 | 1st 2400V 2Ø 60 cycle A.C. Line in Brooklyn, N. Y. |
| 1895 | 1st Overhead Electric Trolley System in U.S.: Nantasket Beach, Mass. |
| 1896 | 1st 11KV 3Ø 25 cycle A.C. Line in U.S.: Niagara Falls - Buffalo, N.Y. 26 miles |
| 1896 | 1st 15KV Transmission Line in U.S.: Ogden River-Salt Lake City, Utah 36 miles |
| 1898 Mar. 21 | 1st 16.7 KV Transmission Line in U.S.: Yuba-Marysville, Calif. 18 miles |
| 1898 | 1st 30KV 3Ø Line in U.S.: Santa Ana Canyon-Los Angeles, California 75 miles |
| 1899 Sept. 4 | 1st 40KV Line in U.S.: Colgate Hydro - Sacramento, California 61 miles |
| 1901 Apr. 7 | 1st 60KV Line in U.S.: Colgate Hydro - Oakland, California 142 miles |
| 1906 | 1st 11KV 1Ø 25 cycle Railroad Electrification—Stamford, Conn. - New York |
| 1908 | 1st 100KV Transmission Line in U.S.: Las Plumas-Oakland, California 155 miles |
| 1908 | 1st 110KV Transmission Line in U.S.: Grand Rapids-Muskegon, Michigan 50 miles |
| 1909 | 1st 110 KV Transmission Line in Canada: Niagara Falls - Toronto |
| 1912 | 1st 140KV Transmission Line in U.S.: Cook Plant - Flint, Michigan 125 miles |
| 1913 | 1st 150KV Transmission Line in U.S.: Big Creek-Los Angeles, Cal. 240 miles |
| 1923 May 6 | 1st 220KV Transmission Line in World: Big Creek - Los Angeles, California 240 miles |
| 1934 | 1st 287KV Transmission Line in U.S.: Hoover Dam-Los Angeles, California 300 miles |
| 1954 | 1st 330KV Transmission Line in U.S.: Portsmouth, Ohio |

## II—Underground Lines

| | |
|---|---|
| 1880 Nov. 2 | 1st D.C. Underground Distribution System demonstrated at Menlo Park, N. J. |
| 1881 Apr. 19 | 1st Edison 120V 2 Wire Underground Tubes laid in N.Y.C. |
| 1883 | Edison 240V 3 Wire System exhibited at Louisville Exposition |
| 1883 Oct. 8 | 1st Edison 240V 3 Wire System in Service - Brockton, Mass. |
| 1885 | 1st Oil Filled Pipe Type Underground Cable System developed by David Brooks of Philadelphia, Pa. |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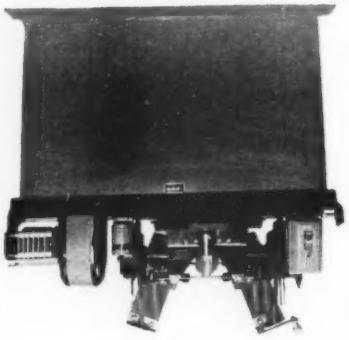

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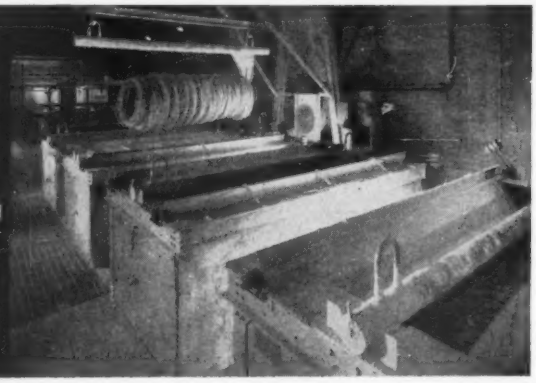

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Driver-Harris Co.
B. Greening Wire Co., Ltd.
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Jones & Laughlin Steel Corp.
Republic Steel Corp.
Sheffield Steel Div., Armco Steel Corp.
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| | |
|---|---|
| 1885 | 1st Hollow Core Cable Invented by J. J. C. Smith |
| 1887 July | Edison 240V 3 Wire Tube System installed in N.Y.C. |
| 1889 | Edison 240V 3 Wire Tube System installed in Brooklyn, N. Y. |
| 1890 | 1st 10KV Paper Insulated Conductors: Deptford-London, England (Ferranti) |
| 1893 | 1st 2200V 2Ø 60 Cycle Dist. System Columbian Exposition, Chicago, Ill. (Westinghouse) |
| 1894 | 1st Use of Paper Insulation on Power Cables |
| 1896 | 1st 2400V 2Ø A.C. Underground Transmission in N.Y.C. |
| 1897 | 1st 4500V 3 Conductor Paper Insulated Cables Purchased by Chicago Edison |
| 1897 | 1st 6600V 3Ø A.C. Underground Transmission in Brooklyn, N. Y. |
| 1898 Nov. 3 | 1st 6600V 3Ø A.C. Underground Transmission in N.Y.C. |
| 1900 | 1st 25,000 Volt Cable Made In U.S. |
| 1901 | Paper Insulation Supersedes Rubber on 6600V Underground Cables in N. Y. |
| 1908 | Sector shaped conductors developed in U.S. |
| 1910 Dec. 10 | 1st 3x350 MCM Sector 6600V Paper Insulated Cable Purchased by N. Y. E. Co. |
| 1913 | 1st 7800V Underground Cables Installed In N.Y.C. |
| 1913 | 1st 15000V Underground Cables Installed In N.Y.C. |
| 1915 | 1st 24000 Underground Cables Installed In N.Y.C. |
| 1916 | Type "H" Cable Patented by Martin Hochstadter |
| 1920 | 1st Type "H" Cable in World Installed At Fall River, Mass. (25 KV) |
| 1921 | 1st 33,000V Paper Cable Installed In Los Angeles, California |
| 1921 | 1st 3Ø A.C. Distribution System Installed In N.Y.C. |
| 1921-5 | N.Y.C. Changes From 6,600V to 11,000V and from 7,800V to 13,200V |
| 1922 | 1st 35,000V Type "H" Cable Installed In Los Angeles, California |
| 1922 | 1st 120/208V AC Network System Installed In N.Y.C. |
| 1922 Oct. | 1st 27KV Underground Transmission Hell Gate - Brooklyn, N. Y. |
| 1923 Apr. 28 | 1st 45KV Cable In World: N.Y.C. - New Rochelle, N. Y. (11 miles) |
| 1924 | 1st 45KV Pirelli Cables: NY.C. - New Rochelle, N. Y. |

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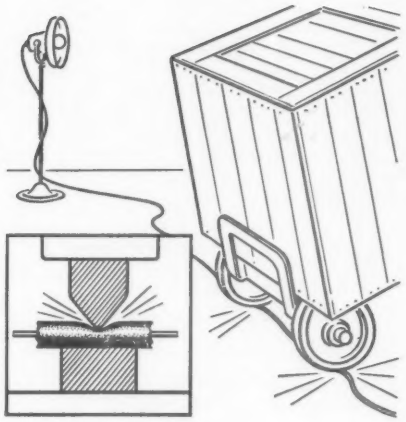
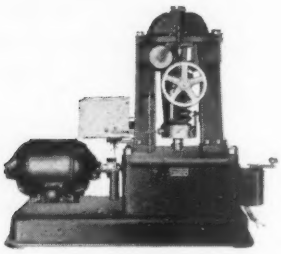
## tests cutting resistance of insulating sheath





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| | |
|---|---|
| 1924 | 1st 66KV Cable In World: Cleveland, Ohio |
| 1925 June 9 | 1st 132KV ¾" Hollow Core Pirelli Cable: Hell Gate - Dunwoodie (Service 8/9/27) |
| 1925 | Wood Pulp Paper Replaces Manila In Paper-Insulated Cables |
| 1927 June 1 | 1st 132KV Pirelli Cable In Service In Chicago, Ill. |
| 1929 Feb. 3 | 1st 132KV ½" Hollow Core Pirelli Cable: Hell Gate - Dunwoodie (Service 10/31/29) |
| 1929 | 1st 75KV Submarine Cable: Deepwater, N. J. |
| 1932 Oct. | 1st 132KV High Pressure Oil Pipe Type Cable in U.S.: Plymouth Meeting, Pa. |
| 1935 Sept. | 1st 27KV 3 Conductor Oil Filled Cable Ordered by Con. Edison |
| 1938 | 1st Gas Filled Cables Developed by G. E. Company |
| 1939 May | 1st 15KV and 27KV Gas Filled Cables Ordered by Con. Edison |
| 1939 Nov. 16 | 1st 29KV 3 Conductor Oil Filled Submarine Cables Ordered by Con. Edison |
| 1940 | 1st 110KV High Pressure Gas Pipe Type Cable In U.S.: Detroit, Michigan |
| 1948 Feb. 28 | 1st 132KV High Pressure Oil Pipe Type Cable In N.Y.C. |
| 1948 Dec. 21 | 1st 69KV 3 Conductor Oil Filled Cable Ordered by Con. Edison (Service 4/11/51) |
| 1951 Apr. 11 | 1st 69KV High Pressure Pipe Type Cable In Service In N.Y.C. |
| 1951 May 8 | 1st 132KV High Pressure Pipe Type Cable Ordered For Narrows-Crossing, N. Y. |
| 1952 | 1st 400KV Oil Filled Cable In World Installed In Sweden |
| 1954 Jan. 19 | 1st 15KV Silicone Rubber Generator Cable Ordered by Con. Edison |
| 1954 | 1st 265/460V A.C. Spot Network Off 69KV Pipe Type Cable In N.Y.C. |
| 1954 | 1st 230 KV High Pressure Oil Pipe Type Cable For Sao Paulo, Brazil |
| 1954 | 1st 230KV High Pressure Oil Pipe Type Cable For Garrison Dam, N. D. |
| 1954 | 1st 301KV Oil Filled Cable Installed In Canada. |

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"Consolidated Gas Co. of New York" F. L. Collins 1934
"A Power History of The Consolidated Edison System, 1878-1900" Payson Jones 1940

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"Tentative History of The Electrical Industry" ..... AEIC 1940
"Men and Volts—The Story of General Electric" ..... J. W. Hammond 1941
"A Chronological History of Electrical Development" .. NEMA 1946
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## Fume Elimination for Wire Enameling Ovens

(*Continued from page* 64)

through direct cost reduction will depend upon local heating costs and the present frequency of shutdowns for reject losses and cleaning. In most cases, it can be shown that equipment cost is returned in from six to twenty-four months. Catalytic methods of fume correction are thus making a substantial contribution to the efficient production of enameled wire while providing improved community relations and other substantial benefits on a by-product basis.

## NEMA's Annual Convention in Atlantic City

(*Continued from page* 64-A)

**Kaiser Aluminum and Chemical Sales, Inc.; J. M. Taylor,** Hamden, Conn., Vice President, **Whitney Blake Co.; S. E. Yeaton,** Trenton, General Product Manager, **John A. Roebling's Sons Corp.; Vernon W. Heimberger,** Cleveland, Manager of Electrical Product Sales, **American Steel and Wire Div., U.S. Steel Corp.; R. C. Bennett, Jr.,** Pittsburgh, Vice President - Sales, **National Electric Products Corp.; W. J. Shea,** Ft. Wayne, Executive Vice President, **Paranite Wire and Cable Div., Essex Wire Corp.;** and **Samuel Rea,** Fort Wayne, President, **Rea Magnet Wire Co., Inc.**

★ ★ ★

**One** of the top speakers was **J. Carlton Ward, Jr.,** president of **Vitro Corporation of America.** Mr. Ward, an authority on atomic energy, discussed Atomic Power and American Industry. Other key addresses were given by **Oliver Burnett,** president, **National Electrical Contractors Association; Sigurd Anderson,** commissioner, **Federal Trade Commission; S. J. Stephenson,** manager, Portable Appliances Div., **Westinghouse**


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**Electric Corp.** and **David Williams**, manager, Cable Bureau, **Consolidated Edison Company of New York, Inc.**

★ ★ ★

**R. J. Ruff**, President, **Catalytic Combustion Corp.**, Detroit, presented a paper on "Fume Burning Equipment" and **J. Weir McHugh**, Vice President, **Schenectady Varnish Co.**, Schenectady, N.Y., delivered a paper entitled "Class B Insulating Varnishes."

## Proceedings of the Annual Convention of The Wire Association

(*Continued from page* 48)

underground ducts, was answered by the speaker saying that it does increase bending difficulties and long radii are necessary. It might be hard to pull through a 360° conduit bend, but these would not be encountered in the applications of this wire. A 24 inch radius bend would be hard to make. The hardness, however, helps to resist deformation and gives better temperature ratings for the conductor.

★ ★ ★

In connection with the effect of even aging or heating of this construction, Mr. Siegfried said they were restricted to quite short samples and more information and other tests will have to be sought. A year from now an answer may be available, but so far the real test has had to be how the cable works in service. In the extruder, the conventional procedures are used, except that temperatures are a little higher. The shield must be dry and not chill the strand to bring about moisture condensation. The cable is kept as warm as possible. Asked whether the shielding adhered to the jacket, he said it could not be scraped off. The polymer was very hot and appeared to melt right into the internal shielding tape.

PAPER: "Measurement of Electrical Conductor Characteristics"
by L. F. Roehmann,
Senior Research Electrical Engineer
Kaiser Aluminum & Chemical Corporation, Department of Metallurgical Research,
Spokane, Washington

Dr. Roehmann was asked if it


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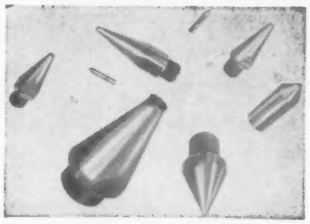

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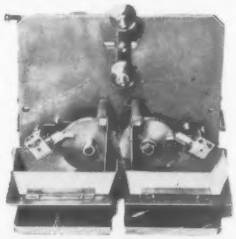

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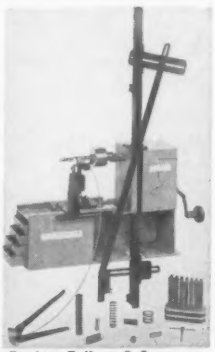

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was possible to verify some of the equations shown, as some believe that calculations of current carrying capacities obtained this way don't always hold. He replied that experimental work and theory should go hand in hand and at the moment they are interested in experimental verification of data, rather than in setting up material. They like to investigate such data experimentally with equipment used for the purpose. Dr. Roehmann also stated that parallel studies had been made for copper. The studies do not consider the effects of temperature, because of the altitude at which they are made.

October 31, 1956
CHAIRMAN OF MEETING
Raymond H. Dudley, Chief Chemist,
Whitney Blake Co., New Haven, Conn.
PAPER: "Drawing Quality Aluminum Wire"
by O. L. Burtenshaw,
Senior Metallurgist and
R. E. Hutchinson, Wire Drawing Supt.
Kaiser Aluminum & Chemical Co.,
Newark, Ohio

Are aluminum alloys being developed to give high tensiles sufficient to replace galvanized core wire in ACSR cable?, it was asked. Mr. Burtenshaw said work was being done, but so far it is entirely experimental and the outcome is not yet known. So far nothing replaces the core wire. Dr. Roehmann concurred in this last opinion.

★ ★ ★

For drawing aluminized wire, it was stated that the same precautions against scratching the surface should be taken that are used for drawing aluminum wire.

PAPER: "Plasticizers for the Wire and Cable Industry"
by William C. Goodwine,
Sales Representative
Tennessee Products & Chemicals Corp.,
New York, N. Y.

Mr. Goodwine was asked whether the 30% of the people who were not blending their own compounds represented a trend. He said a few years back everybody was buying their compounding equipment, aided and abetted by the large resin companies. He felt the full cycle had been reached with the introduction of polemerizers of

vinyl chlorides and some concerns have stopped blending in favor of buying pre-compounded, pre-plasticized materials. It is largely a question of the individual firm's economics. Better plasticizers are available at lower cost and resin prices have come down. The largest cost factor today is labor and savings on blending in the plant have decreased. This, he said, was just his personal opinion.

PAPER: "Continuous Production Electroplating of Tin on Copper Wire Using Alkaline Potassium Stannate Bath"

by M. K. Schurter, Development Engineer, Federal Wire and Cable Company, Limited, Guelph, Ontario, Canada, and

R. T. Gore, Market Development Engineer, Metal and Thermit Corporation, Rahway, New Jersey

**Mr.** Schurter said that if thin oxides or salts are found on the wire, making it discolored, that washing facilities are then inadequate. The cleaning solution must be completely removed.

**For** size 14 wire, redrawing as described is on production lines and not in experimental tests. Wire is tinned, drawn and then annealed. Mr. Gore said that because of the softness of tin, in drawing the dies must be perfect or will cause imperfections that show up in the dip test.

* * *

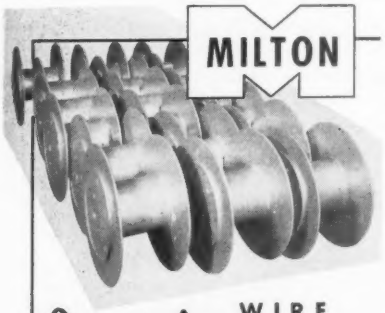
**A** request for additional details on the continuous annealing process, particularly the danger of electrical contact, drew comments to the effect that sparking might produce holes in the coating and to avoid this, spare contact wheels were kept on hand so that if sparking occurs the wheel can be changed immediately, the defective wheel being returned to stock for refinishing. Initial evidence of sparking need not be serious. Defective wheels are reground before finishing.

* * *

**Mr.** Schurter said that wheels were replaced about every two days, but that they are working to get conditions that will make changes more often than once a week unnecessary. An electroplated copper film is deposited on the wheel to make a good contact, but this wears off due to slippage and when it does, sparking occurs.

* * *

**The** fine line of wire of .064 diameter has a 260 millionths coating of tin. It preferably should be over 220 millionths always—never less than 200 millionths. The smallest wire has been drawn to 30 gauge at Federal but experiments are being conducted on #36. Much of the wire is #14 for building wire. This is tin plated in annealed form and since it goes through in a relatively straight line, it is not worked enough to harden it. Number 18 wire has been given an extra heavy coating of tin and drawn 22 passes to #40 and passed the dip test satisfactorily, Mr. Gore stated. Silicone wipers are used because they are not attacked by the solutions. For larger wire these are replaced more often than on fine wires, since there appears to be more copper dust on the larger sizes. Most of the copper dust is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removed at the cleaning tank, which is where the wipers are changed most frequently. Too great an accumulation of copper dust will break small wires. A 250 pound reel of wire will require several changes of wipers.

★ ★ ★

**Relative** to cleaning, Mr. Schurter said they did not use acid, but alkalis. This is a cathodic treatment in a bath containing cyanide. This removes the oxide and minimizes any problem of dragging an alkaline solution into an acid bath or vice versa, greatly simplifying the rinsing operation. In this particular case (at Federal) the bath contains sodium carbonate and sodium cyanide. When the constituents are depleted the bath is dumped, as the ingredients are cheap. This makes analysis of the pH unnecessary.

★ ★ ★


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**The** advantage of this electro process is that its last stage requirements are less than in a positive process. The economics of the process, against hot-dip, is that while the latter takes less floor space, the other increases production. For example, one can produce 100 pounds per square foot by hot dipping and 150 pounds by electro tinning. Three times the length is needed for electroplating, but the rinse requirements are one-sixth that needed for hot-dipping. The capacity is increased 50% and labor costs are less. Definite savings, including materials, are possible with electro-tinning, Mr. Gore added.

★ ★ ★

**Regarding** transformation of tin, a questioner said that The Military came to them two years ago to discuss this in connection with pure tin. They favored hot-dipping for Signal Corps work. Transformation started around 57°F and as the temperature lowers the tin transforms to powder on electro-tinned wire. Samples studied by the Signal Corps only two months ago looked bad. In three months at -40° practically all the tin had decomposed. Is there any possibility, by potassium stannate or other means of overcoming this—possibly the use of an antimony or lead tin would overcome it? Mr. Gore said they knew tin transformed at about 14°C, but it does not always occur. Normal, or so-called white tin, does not transform. The finer the tin, the more rapid the transformation. With small additives, the transformation is completely inhibited. For this bismuth and antimony are good. Tin-zinc, with 20% zinc, will not transform. Any tin alloy used in another type of plating will work out well with the alkaline process. There is some tendency toward cementation with antimony, which has to be removed from time to time. The use of a tin-zinc on wire is new to hot-dipping, but has been used for years in making electro deposits. It has good solderability too. The life of the tin-zinc coating is superior to pure tin or to other alloys.

★ ★ ★

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## "Manufacture and Properties Of Steel Wire"

A new book by Anton Pomp, Dr. Eng. translated from German into English by C. P. Bernhoeft, Dipl. Eng., and published by The Wire Industry, London, Eng. It contains 358 pages of text and sells for $11.80 per copy.

It is the most up-to-date treatise on steel-wire manufacture available and covers the latest developments in wire processing, such as mechanical descaling, increased drawing speeds and lubricants for these high speeds, die shapes and modern testing procedures. The entire range of wire manufacture, from rods to finished products are discussed.

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•

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**Mr.** Gore, in response to a question, said that 40 gauge electro-tinned wire was not continuously annealed, but is produced as a hard drawn wire.

★ ★ ★

**The** electro-plating set-up at Federal has four lines of wire and each wire may be a different diameter.

★ ★ ★

**Coming** back to the economics of electro-plating, while there is a greater capital investment, it was felt that about 25% less tin was used. The stannate bath remains fairly constant, only the anodes having to be replaced. Taken all together, the electro-plating is better on costs, even including depreciation.

★ ★ ★

**Regarding** whether there is a fundamental difference in structure between tin that has been chilled from a molten bath and electro deposited tin, Mr. Gore stated that he had no specific information, but a comparison between electro-plated wire and one that had been annealed, the one that had been after annealed would be less susceptible to transformation.

★ ★ ★

**The** use of two tanks in series is a matter of plating efficiency. One long tank can be used under some conditions. Heavier coatings can be obtained with two tanks because of the better current distribution.

★ ★ ★

**Plating** of aluminum wire is at present more of an art than a science. Aluminum has to have a pre-treatment before plating and it is a long operation and bulky; it is possible but not yet a production operation.

★ ★ ★

A final question on the economics of acid vs. alkali plating was responded to by Mr. Gore saying that the alkaline bath was simpler, less expensive and easier to control. No data has been published on it, however.


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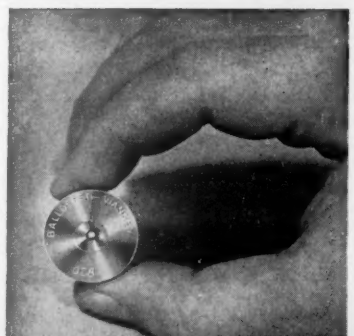

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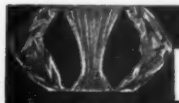
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**The** booklet describes types of steel available as base material, tensile strength and corrosion resistance characteristics of various coating thicknesses and may be obtained by requesting Bulletin K-10 from National-Standard So., Niles, Mich.

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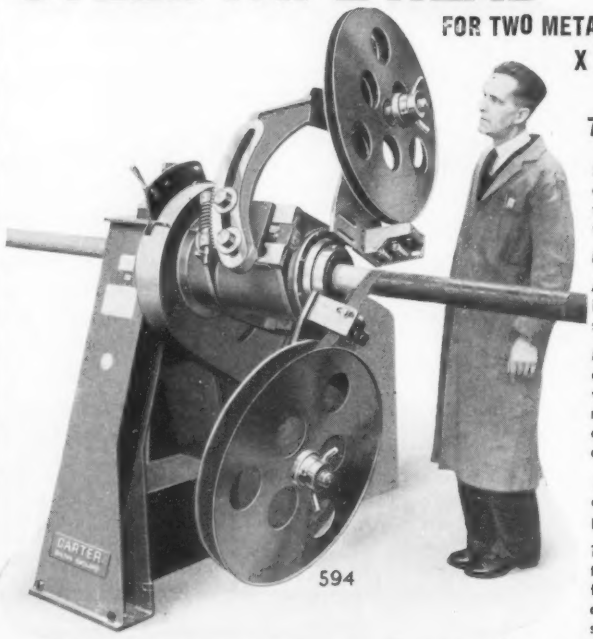


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### ABRASIVES—
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Norton Co., Worcester, Mass.

### ACID INHIBITORS—
(See Inhibitors, Pickling)

### ADJUSTABLE SPEED DRIVES—
The Louis Allis Company, Milwaukee, Wisc.

### ANNEALING MACHINES — Electric Resistance
Syncro Machine Co., Perth Amboy, N. J.

### ANNEALING POTS AND BOXES—
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.

### BAKERS—
(See OVENS—Rod Bakers)

### BOBBINS—Braider & Wire Weaving
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg C., Attleboro, Mass.
Carter & Co., Ltd., B. & F., Bolton, England.
Milton Machine Works, Inc., Milton, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Plastic Mold Engineering Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

### BORAX—Wire Drawing
United States Borax & Chemical Corp., Pacific Coast Borax Co. Div., New York, N. Y.

### BORON CARBIDE—
Norton Co., Worcester, Mass.

### CABLE FILLERS—Paper
Plymouth Cordage Company, Plymouth, Mass.

### CAPSTANS—for Wire
Litzler, C. A. Co., Inc., Cleveland, Ohio.

### CARRIERS—Braider, High Speed
Apco Mossberg Co., Attleboro, Mass.
Carter & Co., Ltd., B. & F., Bolton, England.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

### CASTINGS—Wire Mill
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.

### CEMENTS—Refractory
Norton Co., Worcester, Mass.

### CLEANERS—Metal
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Phila., Pa.
Miller, R. H., Co., Inc., Homer, N. Y.
Parkin Chemical Co., The, Pittsburgh, Pa.
Rome Soap Manufacturing Co., Rome, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.

### CLEANING & PICKLING EQUIP.—
Cleveland Tramrail Div., of the Cleveland Crane & Engineering Co., Wickliffe, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee Engr. Co., Cleveland, Ohio

### CLOTH—WIRE, All Metals
Baker, James S., (Imports) Co., San Francisco, Calif.
Chase Brass & Copper Co., Waterbury, Conn.
Wickwire Bros., Cortland, N. Y.

### COATING COMPOUNDS—
Apex Alkali Products Co., Philadelphia, Pa.
Miller, R. H., Co., Homer, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.
Tri-State Industrial Lubricants, Morton Grove, Illinois.

### COMPOUNDS—Coppering
American Chemical Paint Co., Ambler, Pa.
Miller, R. H. Co., Inc., Homer, N. Y.

### COMPOUNDS—Diamond (Pre-Mixed)
Eastern Carbide Corp., New Rochelle, N. Y.
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hyprez Div., Engis Equipment Co., Chicago
Rusch Wire Die Corporation, Croton-on-Hudson, N. Y.

### COMPOUNDS—Extrusion for Wire
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers Products Corporation, New York, N. Y.

### COMPOUNDS—For Improving Drawing & Extrusion
American Chemical Paint Co., Ambler, Pa.

### COMPOUNDS—Metal Finishing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.

### COMPOUNDS—Phosphate Coating
American Chemical Paint Co., Ambler, Pa.

### COMPOUNDS—Rust Preventing
American Chemical Paint Co., Ambler, Pa.
American Lanolin Corporation, Lawrence, Mass.
Apex Alkali Products Co., Philadelphia, Pa.
Rome Soap Manufacturing Co., Rome, N. Y.

### COMPOUNDS—Rust Removing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Standard Industrial Compounds Co., Frankfort, Ill.

### COMPOUNDS—Vinyl
Monsanto Chemical Company, Plastics Division, Springfield, Mass.

### COMPOUNDS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Miller, R. H. Co., Inc., Homer, N. Y.
Nopco Chemical Co., Harrison, N. J.
Rome Soap Manufacturing Co., Rome, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.
Swift & Company, Chicago, Ill.
Tri-State Industrial Lubricants, Morton Grove, Illinois.
United States Borax & Chemical Corp., Pacific Coast Borax Co. Div., New York, N. Y.

### CONDUCTORS—Flexible, Electrical
Montgomery Co., The, Windsor Locks, Conn.

### CONTAINERS—Wire Packaging
(See DRUMS—Wire Packaging)

### COPHOLDERS—Steel
Apco Mossberg Co., Attleboro, Mass.
Carter & Co., Ltd., B. & F., Bolton, England
Mossberg Pressed Steel Corp., Attleboro, Mass.
Plastic Mold & Engineering Co., Providence, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

### CORDS—Electrical, Tinsel Conductor
Montgomery Co., The, Windsor Locks, Conn.

### COUNTERS—
(See MACHINERY—Measuring Wire and Cable)

### CRANES—Wire Mill
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

### CUTTING TOOLS—Carbide
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit.
Vascoloy-Ramet Corp., Waukegan, Ill.

### CUTTING TOOLS—Wire
Porter, H. K., Inc., Somerville, Mass.
Robinson, M. W. Co., Rockfall, Conn.

### DIAMONDS—Industrial
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Molina-Straus Diamond Products Co., New York, N. Y.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Wayne Wire Die Co., Hillside, N. J.

### DIAMOND POWDERS
Danforth, The C. W. Co., Youngstown, Ohio
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Indiana Wire Die Co., Ft. Wayne, Ind.
Industrial Diamond Powders, Inc., Pittsburgh, Pa.
Kelly Wire Die Corp., New York, N. Y.
Molina-Straus Diamond Products Co., New York, N. Y.
National Research Company, St. Clair Shores, Mich.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

### DIAMOND POWDER RECLAIMING—
Danforth, The C. W. Co., Youngstown, Ohio
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Industrial Diamond Powders, Inc., Pittsburgh, Pa.
Kelly Wire Die Corp., New York, N. Y.
National Research Co., St. Clair Shores, Mich.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.

### DIAMOND TOOLS—
Indiana Wire Die Co., Ft. Wayne, Ind.
Metal Carbides Corporation, Youngstown, Ohio
Molina-Straus Diamond Products Co., New York, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

### DIES—Carbide, Tungsten & Tantalum
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Metallurgical Products Dept. of General Electric Co., Detroit
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Vascoloy-Ramet Corp., Waukegan, Ill.
Wayne Wire Die Co., Hillside, N. J.

### DIES—Cold Heading
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit
Vascoloy-Ramet Corp., Waukegan, Ill.

### DIES—Diamond
Ajax Industrial Supplies, Inc., Ft. Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Brenon, Inc., New Brunswick, N. J.
Ft. Wayne Wire Die Inc., Fort Wayne, Ind.
Hoosier Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
National Wire Die Co., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

### DIES DIAMOND—Drawing Angle Controlled
Hoosier Wire Die, Inc., Ft. Wayne, Ind.

### DIES DIAMOND—Reversible
National Wire Die Co., New York, N. Y.

### DIES—Extrusion
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Kelloy Corporation, New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

### DIES—Eyelet
Eastern Carbide Corp., New Rochelle, N. Y.
Kelloy Corporation, New York, N. Y.

### DIES—Nail, Nail Cutters, Feeder Blocks, Grippers, etc.
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

### DIES—Pointing
Sjogren Tool and Machine Co., Auburn, Mass.

### DIES—Repairs & Re-Cutting
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Brenon, Inc., New Brunswick, N. J.
Eastern Carbide Corp., New Rochelle, N. Y.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit.
National Wire Die Co., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.

# WHERE TO BUY, Continued

**For more complete information, consult the annual Wire and Wire Products Buyers' Guide.**

Universal Wire Die Co., Cranford, N. J.
Vascoloy-Ramet Corp., Waukegan, Ill.
Wayne Wire Die Co., Hillside, N. J.

**DIES—Special Shapes, Etc.**
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelloy Corporation, New York, N. Y.

**DIES—Swaging**
Sjogren Tool and Mach. Co., Inc., Auburn, Mass.

**DIES—Tube Drawing**
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Hoosier Wire Die., Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Metallurgical Products Dept. of General Electric Co., Detroit.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Vascoloy-Ramet Corp., Waukegan, Ill.

**DRAW BENCHES—**
(See MACHINERY—Draw Benches)

**DRIVES—Electric, Adustable Speed**
The Louis Allis Company, Milwaukee, Wisc.

**DRUMS—Wire Packaging**
Continental Can Company, Van Wert, Ohio

**DRUMS & TRAVERSES—For Cable Reels**
Hubbard Spool Co., Garrett, Ind.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio

**DRYING EQUIPMENT—**
Carl Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.

**ENGINEERS—Consulting**
Insulating Mach'y—Entwistle, Jas. L., Co., Cranston, R. I.
Wire Mill—Clarence S. Arms, Worcester, Mass.

**EYELETS—Brass or Zinc**
Platt Bros. & Co., The, Waterbury, Conn.

**FOAM PRODUCING COMPOUNDS—**
American Chemical Paint Co., Ambler, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

**FREQUENCY CHANGERS—**
The Louis Allis Company, Milwaukee, Wisc.

**FURNACES—Brazing**
Electric Furnace Co., Salem, Ohio

**FURNACES—Galvanizing Equipment**
Electric Furnace Co., Salem, Ohio
Wilson, Lee, Engr. Co., Cleveland, Ohio

**FURNACES—Heat Treating**
Carl Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Wilson, Lee, Engr. Co., Cleveland, Ohio

**FURNACES—Lead Melting**
Electric Furnace Co., Salem, Ohio

**FURNACES—Resistance Heating, Strand**
Trauwood Engineering Co., The, Cleveland, O.

**FURNACES—Salt Bath**
Electric Furnace Co., Salem, Ohio

**FURNACES—Strand Annealing**
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Trauwood Engineering Co., The, Cleveland, O.

**GAUGES—Wire Diameter, Continuous**
Industrial Gauges Corporation, West Englewood, N. J.

**GALVANIZING EQUIPMENT—(See MACHINERY—Galvanizing Wire)**

**GEARMOTORS—**
The Louis Allis Company, Milwaukee, Wisc.

**GRINDERS—Roll**
Norton Co., The, Worcester, Mass.

**GUIDES—For Wire**
Heany Industrial Ceramic Corp., New Haven, Conn.

**GUIDE TIPS—For Extruding Machines (See NOZZLES)**

**HAMMERS—Nail Heading**
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

**HAMMERS—Swaging**
Sjogren Tool and Machine Co., Auburn, Mass.

**HARDSURFACING ALLOYS—**
(See Alloys—Hardsurfacing)

**HOISTS—Electric Travelling**
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio

**INHIBITORS—Pickling**
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

**INKS—Printing, for Insulated Wire**
Kellogg Company, M. W., Chemical Manufacturing Division, Jersey City, N. J.

**INSULATING MATERIALS—**
Chemical Products Co., E. Providence, R. I.
duPont de Nemours Co., (Inc.), E. I., Polychemical Dept., Wilmington, Delaware
General Electric Company, Alkanex Wire Enamel Dept., Schenectady, N. Y.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Plymouth Cordage Company, Plymouth, Mass.
Shawinigan Resins Corporation, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers Products Corporation, New York, N. Y.
United States Rubber Company, Naugatuck Chemical Division, New York, N. Y.

**INSULATING MATERIALS—Paper (For Electric Wire Cable)**
Plymouth Cordage Company, Plymouth, Mass.

**LACQUERING SYSTEMS—See MACH.—Lacquering Electric Wire**

**LACQUERS—For Electric Wire**
Chemical Products Co., E. Providence, R. I.

**LAGGING—Reel**
North Anson Reel Co., No. Anson, Me.

**LAME—LAHN—**
Montgomery Co., The, Windsor Locks, Conn.

**LIME—**
Warner Co., The, Philadelphia and Bellefonte, Pa.

**LUBRICANTS—For Metal Cutting, Stamping and Drawing**
Apex Alkali Products Co., Philadelphia, Pa.
Miller, R. H., Co., Inc., Homer, N. Y.
Nopco Chemical Company, Harrison, N. J.
Rome Soap Mfg. Co., Rome, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.
Tri-State Industrial Lubricants, Morton Grove, Illinois.

**LUBRICANTS—Wire Drawing**
(See Compounds—Wire Drawing)

**LUBRICANTS—Wire Rope**
Swift & Co., Chicago, Ill.

**MACHINERY—Armoring (Cable, Wire, Hose)**
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc., (used), Pawtucket, R. I.

**MACHINERY—Barbed Wire**
Glader Wm., Machine Works, Chicago, Ill.
Wafios, Maschinenfabrik, Reutlingen, Wurtt, Germany

**MACHINERY—Bobbin Winders**
Cedar West Tool Inc., New York, N. Y.
Wire Equipment Mfg. Co., Trenton, N. J.

**MACHINERY—Braiding**
Carter & Co., Ltd., B. & F., Bolton, England
New England Butt Co., Providence, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

**MACHINERY—Bunching**
Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

**MACHINERY—Bundling, Scrap**
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

**MACHINERY—Cable, Electric**
American Insulating Mach'y Co., Phila., Pa.
Cook Mfg. Co., The, Paterson, N. J.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Capstans (See Capstans and Machinery—Winding Wire)**

**MACHINERY—Centerless Grinding & Polishing**
American Laubscher Corporation, New York, N. Y.

**MACHINERY—Chain Making**
Nilson, A. H. Machine Co., Bridgeport, Conn.
Wafios Maschinenfabrik, Reutlingen, Wurtt, Germany

**MACHINERY—Closing Rope**
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Coiling Rod**
Vaughn Mach'y Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

**MACHINERY—Cold Heading**
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

**MACHINERY—Coil Wrapping (Paper)**
McLaurin-Angier Co., Framingham, Mass.

**MACHINERY—Copper Wire Drawing**
American Insulating Mach'y Co., Phila., Pa.
Cook Mfg. Co., The, Paterson, N. J.
National Mach'y Exch (Used), New York
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

**MACHINERY—Covering Wire (See MACHINERY—Insulating Wire)**

**MACHINERY—Cutting**
Eisler Engineering Company, Newark, N. J.
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool, Inc., New Haven, Conn.
Wells, Frank L., Co., Kenosha, Wisc.

**MACHINERY—Descaling Rod, Dry**
Fisher Associates, New York, N. Y.
Herborn, Herborn, Germany

**MACHINERY—Die Making**
Boulin, Victor J., Inc., New York, N. Y.
Dykrex Corp., Roos Tool & Mfg. Div., Newark, N. J.
Firth Sterling, Inc., Pittsburgh, Pa.
Metallurgical Products Dept. of General Electric Co., Detroit
Wayne Wire Die Co., Hillside, N. J.

**MACHINERY—Draw Benches**
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

**MACHINERY—Edging (See MACHINERY — Tandem Rolling and Edging Mills)**

**MACHINERY—Enameling**
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Industrial Ovens, Inc., Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven, Company, Detroit, Mich.

**MACHINERY—Extruding**
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Entwistle Manufacturing Corporation, Providence, R. I.
Prodex Corp., Fords, N. J.
Royle, John, & Sons, Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

**MACHINERY—Fence**
Glader, Wm., Machine Works, Chicago, Ill.

**MACHINERY—Flat Wire**
Fenn Manufacturing Co., Newington, Conn.
Mettler Machine Tool, Inc., New Haven, Conn.
Torrington Mfg. Co., Torrington, Conn.

# WHERE TO BUY, Continued

**For more complete information, consult the annual Wire and Wire Products Buyers' Guide.**

### MACHINERY—Forming Wire
Baird Machine Co., Stratford, Conn.
Nilson, A. H., Machine Co., Bridgeport, Conn.
Wafios Maschinenfabrik, Reutlingen, Wurtt, Germany

### MACHINERY—Galvanizing Wire
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio

### MACHINERY—Gang Winders
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Mfg. Co., Wallingford, Conn.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

### MACHINERY—Grinding
Norton Co., The, Worcester, Mass.

### MACHINERY—Insulating Wire
American Insulating Mach'y Co., Phila., Pa.
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.
New England Butt Co., Providence, R. I.
Pourtier Pere et Fils, Romainville (Seine), France
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

### MACHINERY—Lacquering Electric Wire
American Insulating Mach'y Co., Philadelphia
Cook Mfg. Co., The, Paterson, N. J.
Industrial Ovens, Inc., Cleveland, O.
Michigan Oven Company, Detroit, Mich.

### MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

### MACHINERY—Looms, Wire Weaving
Cedar West Tool Inc., New York, N. Y.
E. V. G., Richard Kleinhans, New York, N. Y.
Maschinen & Stahl A. G., c/o Richard Kleinhans, Zurich, Switzerland
Wafios Maschinenfabrik, Reutlingen, Wurtt., Germany

### MACHINERY—Material Handling
(See Material Handling Equipment)

### MACHINERY—Measuring Wire & Cable
Durant Mfg Co., Milwaukee, Wis.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
New England Butt Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.

### MACHINERY—Nail and Tack
Baird Machine Co., The Stratford, Conn.
Glader, Wm., Machine Works, Chicago, Ill.
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

### MACHINERY—Packaging Wire
Coulter & McKenzie Machine Co., Bridgeport, Conn.

### MACHINERY—Pin Making
Baird Machine Co., The, Stratford, Conn.

### MACHINERY—Plating
Universal Industrial Equipment Co., Secaucus, N. J.

### MACHINERY—Pointing
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York,
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

### MACHINERY—Printing on Electric Wire
Gillies, Duncan M. Co., Inc., Boylston, Mass.

### MACHINERY—Pumps for Molten Metal
Wire Equipment Mfg. Co., Trenton, N. J.

### MACHINERY—Re-Spooling
Emory, Robert J., Co., Newark, N. J.
Federal Manufacturing Company, Wallingford, Conn.
International Wire Products Corp., Woodside Machinery Division, Midland Park, N. J.
National Mach'y Exch. (Used), New York N. Y.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.
Wire Equipment Mfg. Co., Trenton, N. J
Wire Insulating Machinery Inc., Northboro, Mass.
Wire & Textile Mach'y Inc. (used) Pawtucket, R. I.

### MACHINERY—Rod Mill
Fenn Manufacturing Co., Newington, Conn.
Morgan Construction Co., Worcester, Mass.

### MACHINERY—Rolling Mill
Fenn Manufacturing Co., Newington, Conn.
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

### MACHINERY—Rubber Insulating
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Royle, John & Sons, Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

### MACHINERY—Serving
Pourtier Pere et Fils, Romainville (Seine), France
Wardwell Braiding Machine Co., Central Falls, R. I.

### MACHINERY—Spark Testing
Entwistle, Jas. L., Co., Cranston, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Peschel Electronics, Inc., New Rochelle, N. Y.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

### MACHINERY—Spring Making
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany
Wells, Frank L., Co., Kenosha, Wisc.

### MACHINERY—Staple
Nilson, A. H. Machine Co., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

### MACHINERY—Straightening & Cutting
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool Co., New Haven, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Patterson Machine, Geo. C., Co., Cleveland, Ohio
Wells, Frank L., Co., Kenosha, Wisc.

### MACHINERY—Stranding
Carter & Co., Ltd., B. & F., Bolton, England
Haskell-Dawes Machine Co., Philadelphia, Pa.
Milton Machine Works, Inc, Milton, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Superior Tool & Manufacturing Company, Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

### MACHINERY—Stripping Electric Wire & Cable
Burdwood, Howard A., Inc., Portland, Maine

### MACHINERY—Swaging
Fenn Manufacturing Co., Newington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

### MACHINERY—Take-Up and Pay-Out
American Insulating Mach'y Co., Phila., Pa.
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Fenn Manufacturing Co., Newington, Conn.
Industrial Ovens, Inc., Cleveland, Ohio
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Standard Mill Supply Co., Pawtucket, R. I.
Trauwood Engineering Co., The, Cleveland, O.
Watson Machine Co., Paterson, N. J.
Wire Equipment Mfg. Co., Trenton, N. J

### MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Pourtier Pere et Fils, Romainville (Seine), France
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

### MACHINERY—Testing Magnet Wire Coatings for Pin Holes
Federal Mfg. Co., Wallingford, Conn.
Peschel Electronics, Inc., New Rochelle, N. Y.

### MACHINERY—Testing, Physical
Scott Testers, Inc., Providence, R. I.

### MACHINERY—Tinning Wire
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Universal Industrial Equipment Co., Secaucus, N. J.

### MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.

### MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

### MACHINERY—Tube Mill, Cold Drawing
Mettler Machine Tool, Inc., New Haven, Conn.

### MACHINERY—Turks Head
Fenn Manufacturing Co., Newington, Conn.

### MACHINERY—Twinning
(See Mach.—Bunching)

### MACHINERY—Twisters, Wire
Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.

### MACHINERY—Used
National Machinery Exchange, New York, N. Y.
Wire & Textile Machy., Inc., Pawtucket, R. I.

### MACHINERY—Welded Wire Mesh
E. V. G., Richard Kleinhans, New York, N. Y.
Maschinen & Stahl A. G., c/o Richard Kleinhans, Zurich, Switzerland

### MACHINERY—for Wire Welding
(See WELDERS—Butt and Spot and Machinery —Welding Wire Fabrics)

### MACHINERY—Winding Wire
Emory, Robert J., Newark, N. J.
Federal Manufacturing Company, Wallingford, Conn.
Fenn Manufacturing Co., Newington, Conn.
New England Butt Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.
Wire Equipment Mfg. Co., Trenton, N. J.
Wire Insulating Machinery Inc., Northboro, Mass.

### MACHINERY—Wire Drawing
Cook Manufacturing Co., The, Paterson, N. J.
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Federal Mfg. Co., Wallingford, Conn.
Fenn Mfg. Co., Newington, Conn.
Herborn, Herborn, Germany
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Morgan Construction Co., Worcester, Mass.
Morgardshammer Mek Verstads AB, Morgardshammer, Sweden
National Mach'y Exch. (Used), New York, N. Y.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Superior Tool & Manufacturing Company, Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

### MACHINERY—Wire Forming
Baird Machine Co., The, Stratford, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Nilson, A. H. Machine Co., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

# WHERE TO BUY, Continued

**For more complete information, consult the annual Wire and Wire Products Buyers' Guide.**

**MACHINERY—Wire Rope**
Carter & Co., Ltd., B. & F., Bolton, England
Milton Machine Works, Inc., Milton, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.

**MACHINERY—Wrapping with Paper**
Larmuth (1947) Ltd., Swinton, England
McLaurin-Angier, Framingham, Mass.
Terkelsen Machine Co., Boston, Mass.

**MATERIAL HANDLING EQUIPMENT—**
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

**MOTORS—Electric, A.C. & D.C.**
The Louis Allis Company, Milwaukee, Wisc.

**NAIL TOOLING—Tungsten Carbide**
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

**NAILS—Wire**
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Brothers, Inc., Cortland, N. Y.

**NIPPERS—Wire Cutting**
Robinson, M. W. Co., Rockfall, Conn.

**NOZZLES—For Extruding Machines**
Wire Tool Div., Bridgeport Jig Boring Co., Bridgeport, Conn.

**OVENS—Cable Lacquering and Enameling**
American Insulating Mach'y Co., Phila., Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.

**OVENS—Rod Bakers**
Carl Mayer Corp., The, Cleveland, Ohio

**OVENS—Welding Rod Coating**
Carl Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio

**PAINT BONDING CHEMICALS—**
American Chemical Paint Co., Ambler, Pa.

**PAINTS—Heat Resisting**
American Chemical Paint Co., Ambler, Pa.

**PAPER—Creped Wrapping**
Arkell Safety Bag Company, New York, N. Y.
McLaurin-Angier Co., Framingham, Mass.
National Waterproof Papers, Inc., Beverly, N. J.
Terkelsen Machine Co., Boston, Mass.

**PAPER—For Coil Wrapping and Corrosion Prevention**
Arkell Safety Bag Company, New York, N. Y.
McLaurin-Angier Co., Framingham, Mass.
National Waterproof Papers, Inc., Beverly, N. J.
Terkelsen Machine Co., Boston, Mass.

**PAPER—Insulating**
Plymouth Cordage Company, Plymouth, Mass.

**PATENT—ATTORNEYS—**
Lancaster, Allwine & Rommel, Washington, D. C.

**PAY-OUT SYSTEMS—**
(See MACHINERY—Take-Up & Pay-Out)

**PHOSPHATE COATING CHEMICALS**
(See COMPOUNDS—Phosphate Coating)

**PICKLING COMPOUNDS—**
See (Inhibitors—Pickling)

**PLASTICIZERS—**
Monsanto Chemical Company, Plastics Division, St. Louis, Mo.

**PLASTICS COMPOUNDING—Custom**
Plandex Corporation, Downingtown, Pa.

**PLASTICS—for Wire Insulation**
duPont de Nemours Co., (Inc.), E. I., Polychemical Dept., Wilmington, Delaware
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Plandex Corporation, Downingtown, Pa.
Shawinigan Resins Corporation, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers Products Corporation, New York, N. Y.
United States Rubber Company, Naugatuck Chemical Division, New York, N. Y.

**POINTING WIRE**
Main, Robert A. & Sons, Inc., Paramus, N. J.

**POTS—Lacquer**
Industrial Ovens, Inc., Cleveland, Ohio

**PRINTING WHEELS—for Electric Wire**
Gillies, Duncan M. Co., Inc. Boylston, Mass.

**PULLERS AND GRIPS—For Wire**
Morgan Construction Co., Worcester, Mass.
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.
Sjogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

**PUMPS—Molten Metal**
Fisher Associates, New York, N. Y.

**RACKS—Wire Storage**
Jarke Manufacturing Co., Chicago, Illinois.

**REEL AND TENSION STANDS—**
Industrial Ovens, Inc., Cleveland, Ohio
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Mill Supply Co., Pawtucket, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

**REEL CRUTCHES—**
Watson Machine Co., Paterson, N. J.

**REELS & SPOOLS—Aluminum Alloy**
Acrometal Products, Inc., Minneapolis, Minn.
Hubbard Spool Co., Garrett, Ind.
Milton Machine Works, Inc., Milton, Pa.
Wardwell Braiding Machine Co., Central Falls, R. I.

**REELS & SPOOLS—Annealing and Stranding**
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company The, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Garrett, Ind.
Milton Machine Works, Milton, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio

**REELS—Metal Bound**
Durkee Mfg. Co., Inc., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
North Anson Reel Co., No. Anson, Me.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

**REELS—Plywood**
Carris Reels, Inc., Rutland, Vt.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Nelson Company, The, Baltimore, Md.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

**REELS & SPOOLS—Steel (All Types)**
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company The, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L. Mfg. Co., Rockford, Ill.
Hubbard Spool Co., Garrett, Ind.
Mason Can Company, East Providence, R. I.
Milton Machine Works, Inc., Milton, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New York Engineering Co., New York, N. Y.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

**REELS—Wire Mill**
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company The, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
Mason Can Co., East Providence, R. I.
McCaskie, Inc., William, Westport, Mass.
Mettler Machine Tool, Inc., New Haven, Conn.
Milton Machine Works, Inc., Milton, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New York Engineering Company, New York, N. Y.
Nilson, A. H. Machine Co., Bridgeport, Conn.
North Anson Reel Co., No. Anson, Me.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

**REELS & SPOOLS—Wood**
American Woodworking Co., Chicago, Ill.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Nelson Company, The, Baltimore, Md.
North Anson Reel Co., No. Anson, Me.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

**REFRACTORIES—High Temperature**
Norton Company, Worcester, Mass.

**ROD BAKERS—**
(See OVENS—Rod Bakers)

**RODS—Stainless Steel**
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Pittsburgh Steel Co., Pittsburgh, Pa.

**RODS—Wire—Non-Ferrous**
Chase Brass & Copper Co., Waterbury, Conn.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Platt Bros. & Co., The, Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.

**RODS—Steel**
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

**ROPE—Wire**
Bethlehem Steel Co., Bethlehem, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.

**RUST PROOF COMPOUNDS—**
(See COMPOUNDS—RUST Preventing)

**RUST REMOVING COMPOUNDS—**
(See COMPOUNDS—RUST Preventing)

**SATURATION SYSTEMS—**
Industrial Ovens, Inc., Cleveland, Ohio
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y Inc. (used) Pawtucket, R. I.

**SOAPS—Industrial and Wire Drawing**
(See COMPOUNDS—Wire Drawing)

**SPOOLS—(See Reels & Spools)**

**SPOOLS—Braider, Wire**
Plastic Mold & Engineering Co., Providence, R. I.

**SPOOLS—Stamped Metal for Retail Wire Sales**
Clark, J. L. Mfg. Co., Rockford, Ill.
Mason Can Company, East Providence, R. I.

**STAMPINGS—Steel**
Acrometal Products, Inc., Minneapolis, Minn.
Mossberg Pressed Steel Corp., Attleboro, Mass.

**STOCK STORAGE SYSTEMS**
Jarke Manufacturing Co., Chicago, Illinois.

**STRIP—Steel**
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

**TABLES—Press Feeding**
Jarke Manufacturing Co., Chicago, Illinois.

**TANKS—Compound**
Watson Machine Co., Paterson, N. J.

**TESTERS—INSULATION**
(See MACHINERY—Spark Testers)

**TESTING EQUIPMENT**
(See MACHINERY Testing, Physical and Diameter Testing)

**TINSEL—Electric Conductor**
Montgomery Co., The, Windsor Locks, Conn.

**TINSEL WIRE—Resistance, Lame, Decorative Cords Thread—Bare Copper Silver and False Gold Coated, etc.**
(See TINSEL—Electric Conductor)

**TOOLS—Nail Machine**
Pittsburgh Carbide Die Co., Monongahela, Pa.
Wire Equipment Mfg. Co., Trenton, N. J.

# WHERE TO BUY, Continued

**For more complete information, consult the annual Wire and Wire Products Buyers' Guide.**

**TOOLS—Wire Cutting**
Porter, H. K., Inc., Somerville, Mass.

**TRAMRAIL SYSTEMS—**
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

**TRANSMISSIONS—Variable speed (See Adjustable Speed Drives)**

**TRAVERSES & DRUMS—For Reels**
(See Drums & Traverses)

**TRAVERSE MECHANISMS—**
Apco Mossberg Co., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

**VARNISHES & LACQUERS—for Electric Wire**
Chemical Products Co., E. Providence, R. I.
General Electric Company, Alkanex Wire Enamel Dept., Schenectady, N. Y.
Shawinigan Resins Corporation, Springfield, Mass.

**VULCANIZING PANS AND EQUIPMENT—**
American Insulating Mach'y Co., Phila, Pa.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Wire Insulating Machinery Inc., Northboro, Mass.

**WELDERS—Spot and Butt and Welding Wire Fabrics**
Eisler Engineering Corp., Newark, N. J.
Micro Products Co., Chicago, Ill.

**WIRE—Aluminum**
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Malin & Co., The, Cleveland, Ohio
Scovill Mfg. Co., Waterbury, Conn.
United Wire & Supply Corporation, Providence, R. I.

**WIRE—Ball**
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

**WIRE—Barbed**
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.

**WIRE—Brass and Bronze**
Chase Brass & Copper Co., Waterbury, Conn.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Scovill Mfg. Co., Waterbury, Conn.
United Wire & Supply Corporation, Providence, R. I.

**WIRE—Bunched & Stranded, Copper**
Camden Wire Co., Camden, N. Y.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.

**WIRE—Cadmium**
Stamford Processing Co., Peekskill, N. Y.

**WIRE—Cast**
Youngstown Sheet & Tube Co., Youngstown, O.

**WIRE—Cold Heading**
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Camden Wire Co., Camden, N. Y.
Chase Brass & Copper Co., Waterbury, Conn.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Scovill Mfg. Co., Waterbury, Conn.
Sheffield Steel Corp., Kansas City, Mo.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

**WIRE—Copper**
Camden Wire Co., Inc., Camden, N. Y.
Chase Brass & Copper Co., Waterbury, Conn.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
United Wire & Supply Corporation, Providence, R. I.

**WIRE—For Electrical Conductors**
Camden Wire Co., Camden, N. Y.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
United Wire & Supply Corporation, Providence, R. I.

**WIRE—Flat, Fine**
Montgomery Co., The, Windsor Locks, Conn.
United Wire & Supply Corporation, Providence, R. I.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

**WIRE—Galvanized**
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

**WIRE—High Carbon**
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

**WIRE—Manufacturers**
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Keystone Steel & Wire Co., Peoria, Ill.
National Lock Washer Company, The, Newark N. J.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Scovill Mfg. Co., Waterbury, Conn.
Sheffield Steel Corp., Kansas City, Mo.
United Wire & Supply Corporation, Providence, R. I.
U. S. Steel Corp., N. Y., N. Y.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

**WIRE—Metalizing**
Stamford Processing Co., Peekskill, N. Y.

**WIRE—Music**
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Malin & Co., The, Cleveland, Ohio
Worcester Wire Works Div., National-Standard Company, Worcester, Mass.

**WIRE—Needle**
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

**WIRE—Nickel Alloy**
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.

**WIRE—Nickel Silver and Phosphor Bronze**
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Malin & Co., The, Cleveland, Ohio
United Wire & Supply Corporation, Providence, R. I.

**WIRE—Oil Tempered**
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

**WIRE—Pointed**
Main, Robert A. & Sons, Inc., Paramus, N. J.

**WIRE—Silver Plated Copper**
Camden Wire Co., Camden, N. Y.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.

**WIRE—Special Shapes**
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
Continental Steel Corp., Kokomo, Ind.
National Lock Washer Company, The, Newark, N. J.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

**WIRE—Spring**
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's John A., Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
United Wire & Supply Corporation, Providence, R. I.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

**WIRE—Stainless Steel**
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Firth Sterling, Inc., Pittsburgh, Pa.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
National Lock Washer Company, The, Newark, N. J.
Pittsburgh Steel Co., Pittsburgh, Pa.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

**WIRE—Steel—Also Coppered and Galvanized Steel**
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

**WIRE—Straightening and Cutting**
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

**WIRE—Tinned Copper**
Camden Wire Co., Camden, N. Y.
International Wire Products Corporation Woodside Machinery Division, Midland Park, N. J.

**WIRE—Zinc**
Platt Bros. & Co., The, Waterbury, Conn.
Stamford Processing Co., Peekskill, N. Y.

**WOOD—for Guide, Rolls, Bushings, Wear Parts, etc.**

**WRAPPING PAPER—Creped**
(See PAPER—Creped Wrapping)

**YARN TESTERS—**
Scott Testers, Inc., Providence, R. I.

# The WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON 3, NEW JERSEY, U. S. A.

ELECTRICAL WIRE AND CABLE, WIRE ROPE, CORDAGE
AND MASTICATING MACHINERY MANUFACTURERS

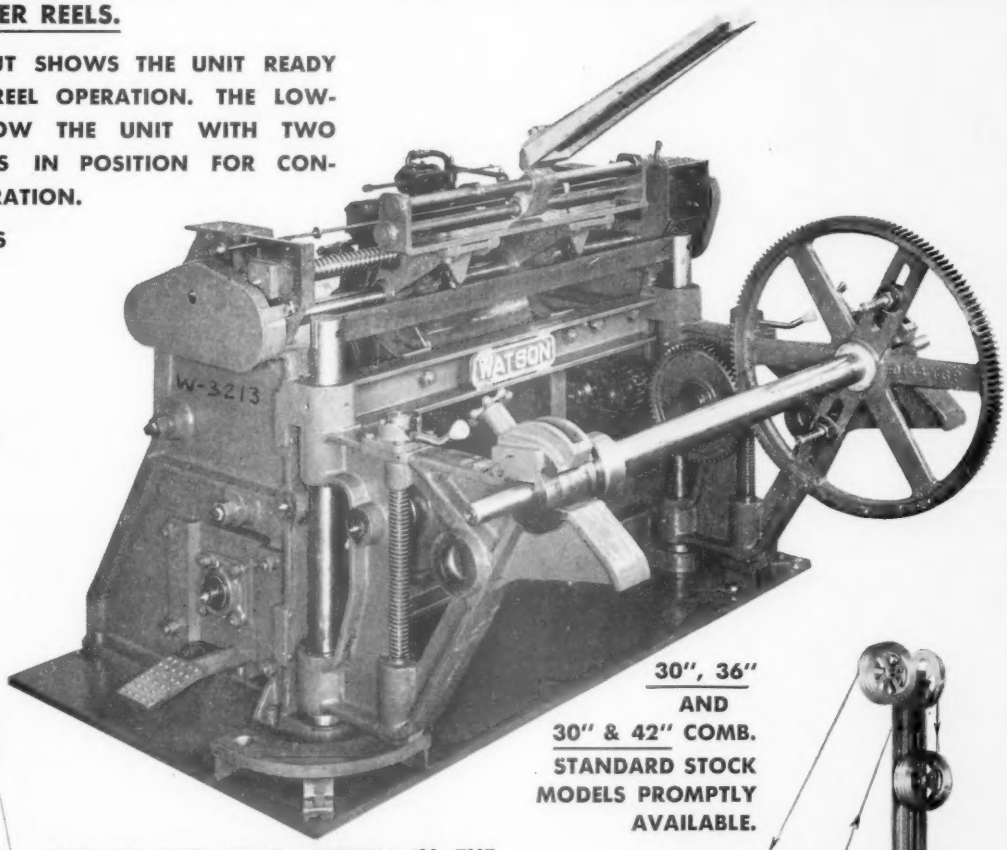
WATSON

# TAKEUPS TYPE "DC"

**THIS DOUBLE PURPOSE "COMBINATION" MODEL OPERATES WITH SINGLE LARGE REELS AND QUICKLY CONVERTS TO A CONTINUOUS TAKEUP OPERATING WITH TWO SMALLER REELS.**

THE UPPER CUT SHOWS THE UNIT READY FOR SINGLE REEL OPERATION. THE LOWER CUTS SHOW THE UNIT WITH TWO SMALLER REELS IN POSITION FOR CONTINUOUS OPERATION.

IN BOTH CASES THE TAKEUP FUNCTIONS WITHOUT FRICTION-SLIP, AND THE WINDING TENSION REMAINS UNIFORM DURING THE REEL-RUN BUILD-UP.

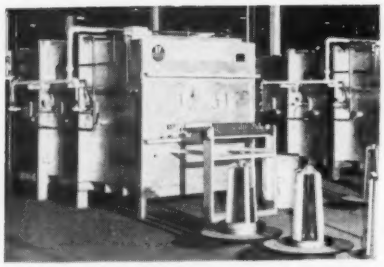


ANY OF OUR "DC" TAKEUPS IN THE FIELD CAN EASILY BE CONVERTED TO "COMBINATION" MODELS BY SUPPLY OF ADDITIONAL PARTS, WITHOUT DISTURBING THE TAKEUP LOCATION.

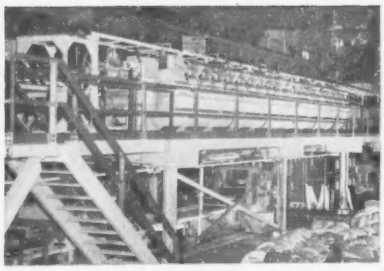
30", 36" AND 30" & 42" COMB. STANDARD STOCK MODELS PROMPTLY AVAILABLE.

Machine bulletin 010553 available.

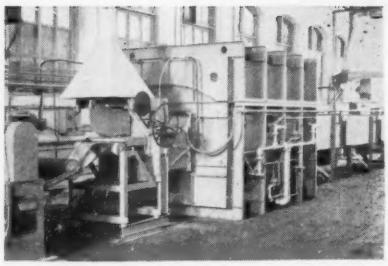
1-57



An EF multiple tube type furnace bright annealing stainless steel wire, continuously. One of an installation of five stainless steel furnaces we built in a prominent steel plant.

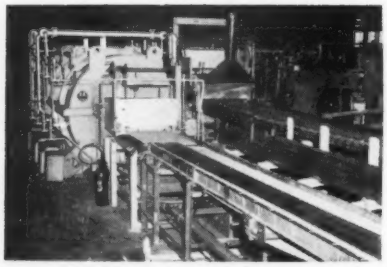


Large capacity EF gas fired furnace bright annealing stainless strip. We build them electrically heated or gas fired for wide or narrow strip, for single or multiple strands.

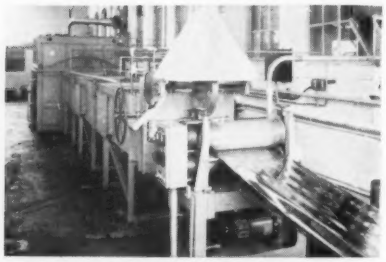


Stainless steel strip in various widths is bright annealed continuously in this EF gas fired special atmosphere installation equipped with an EF gas fired ammonia dissociator.

# Bright Annealing Stainless



Stainless Steel Tubing in various diameters and lengths up to 24 feet is bright annealed continuously in this EF gas fired furnace.



Stainless Steel Strip. Wide, narrow and in various types, is uniformly bright annealed, continuously, in EF furnaces — any tonnage.

## Tubing, Strip, Wire, Stampings and Other Stainless Steel Products

Stainless steel strip, wire, heavy and fine tubing, stampings, flatware, cooking ware, drawn and other stainless steel products, in many shapes and forms, are being bright annealed, uniformly, economically, continuously and with laboratory precision in EF furnaces of various sizes and types we have built.

Extensive experience with stainless steel problems, backed by over 40 years of practical furnace building experience and thousands of successful fuel fired and electric installations, enable EF engineers to design and build the best size and type of equipment needed for handling any product or production, or for any heat processing requirement.

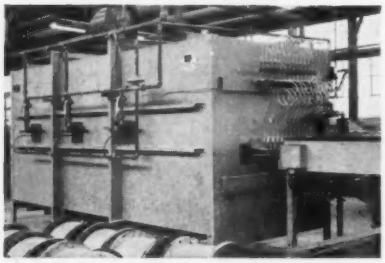
**Submit your production furnace problems to experienced EF engineers — it pays.**

**THE ELECTRIC FURNACE CO.**

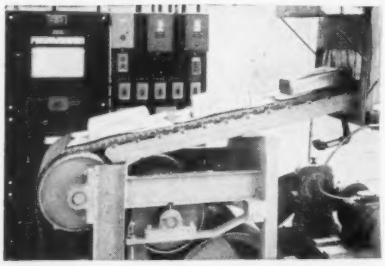
GAS FIRED OIL FIRED AND ELECTRIC FURNACES FOR ANY PROCESS, PRODUCT OR PRODUCTION

Salem - Ohio

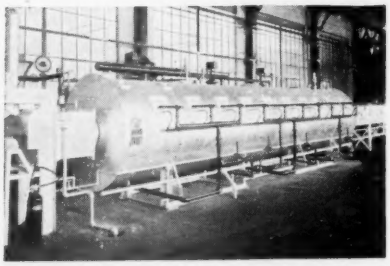
**Canadian Associates • Canefco Limited • Toronto 1, Canada**



Stainless Steel Wire is bright annealed in this and other EF continuous and batch type gas fired and electric furnaces we build.



Stainless Steel Stampings, flatware, drawn and other products; large, small and in various shapes are bright annealed in EF furnaces



Another type we build for bright annealing stainless strip. This EF furnace also handles other grades requiring lower temperatures.